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Hunterian Lecture

ON THE

DIAGNOSIS AND TREATMENT OF SYPHILIS OF THE CENTRAL NERVOUS SYSTEM:

WITH SPECIAL REFERENCE TO THE USE OF NOVARSENOBILLON.

*Delivered before the Royal College of Surgeons of England on Feb. 11th, 1918,**

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MR. PRESIDENT, LADIES, AND GENTLEMEN,—Syphilis is no longer a mystery. Its etiology, diagnosis, and treatment are out in the open for all to know who will. On all sides, from the platform and through the press, an attempt is being made to educate the public in this matter, and at last the very word "syphilis" may be read in the newspapers. This education is needed urgently by all classes, and, to my mind, by none more than the medical profession, for in many cases our efforts to combat efficiently from the outset this curable disease are lamentably poor. This appears to be due to the lack of adequate compulsory training of students of medicine in the early diagnosis and effective treatment of the disease.

My remarks are based upon a considerable experience of the disease as it affects the nervous system of men in the Royal Navy, gained during the past 18 months at the Royal Naval Hospital, Haslar.

I gratefully acknowledge my indebtedness to several authors, and particularly to Staff-Surgeon Paul Fildes, R.N.V.R., and to Surgeon S. L. Baker, R.N., whose help I have had during the whole period under review. I have not besitated to borrow freely from the pathological writings of Staff-Surgeon Fildes.

INTRODUCTORY REMARKS.

The Early Diagnosis of Syphilis.

An exact early diagnosis that syphilis exists is the first essential in our problem. In practice this is omitted quite commonly, as the following cases show:—

CASE 226.4.—Patient, aged 41, was seen by me in May, 1917. Three months previously he had been exposed to infection, and ten days later a sore appeared on the penis. He was sent at once to a hospital where facilities exist for the accurate diagnosis of such cases. No laboratory tests were performed, however, and after receiving three injections of galyl he was discharged to duty as "cured of syphilis."

A week or so after his return to work he had three attacks of unconsciousness in one day, and he was then sent to Haslar as "probably a case of cerebral syphilis," with the note that he had been under treatment recently for "secondary syphilis."

We proved that he was suffering from cerebro-spinal syphilis, and we knew, for many reasons, that his condition was not of recent origin. The man admitted that he had a sore 20 years before, and probably it was this sore which was the evidence of his infection. Thus, the recent sore could not have been syphilitic; probably it was a septic sore. No attempt had been made to determine the existence of syphilis, and the man had been allowed to think that he had contracted the disease recently, and that, by prompt treatment, he had been cured.

CASE 178.3.—Patient, aged 38, was admitted during October, 1916, to receive his second injection of "606." He had a sore in July, 1916, and in August he had his first injection. He said that no tests were made upon the sore or on the blood. On examination prior to the second injection the pupils were found to be abnormal, and on further investigation he was found to have many of the signs of tabes dorsalis. The serum and c.s.f. proved to be normal, however, and he was regarded as a case of arrested disease from some earlier infection. There was no evidence that the recent sore was syphilitic, and yet the man had been started upon a course of injections without any attempt having been made to arrive at an accurate diagnosis, while all the time his condition was stamped upon his face.

CASE 71.5.—In yet another case a young man was admitted in a condition of status epilepticus during July, 1917. In April, 1917, he had contracted a sore and had received galyl. In July, 1917, he had two injections of "914," and it was while he was waiting to come in for his third injection that his illness started. A syphilitic cause for this had to be considered, although this was unlikely in view of his recent treatment with "914." Examination, however, revealed no evidence that he had syphilis or that it had ever been contracted. It was found that no tests had ever been performed upon the sore and that the serum had never been found to be positive, and it appeared that it was necessary that the man should have a serious illness before he could be told with any confidence that he had not contracted and did not suffer from syphilis.

The Diagnosis of Nervous Syphilis.

As regards the diagnosis of syphilis of the nervous system, this can now be *proved* by medical men who possess knowledge of the principles of neurological diagnosis and of modern pathological methods. In the past a certain diagnosis was possible only when the disease had reached an incurable stage. Before this stage was reached the diagnosis rested upon surmise.

Often we hear that a patient denies having contracted syphilis, or that he presents no external evidence of it, or that his wife has healthy children, and we are asked to believe that, on account of these facts, it is unlikely that syphilis is the cause of his illness.

An admission of syphilis, however, is frequently valueless. The evidence which the man can produce to support his statement must be carefully criticised before it is accepted as true. A denial of syphilis, however eminent the patient and however unlikely it may appear that the statement is incorrect, is valueless also, and to believe it is folly. We may believe the man's sincerity perhaps, but we must not unreservedly accept his word, and yet statements such as this carry weight daily among medical men who are not alive to the fact that syphilis may be contracted without a chancre occurring and that the sore may exist without attracting attention. Let us rather prove that the disease is not caused by syphilis. This proof is necessary in every case of nervous or mental disease, for it is now known that a surprisingly large number of such conditions are syphilitic.

The Wassermann reaction (W.R.) affords essential information provided that it is performed by a skilled worker and that the physician recognises the limitations and the apparent fallacies of the test. It is important also that he should have some knowledge of the personal and scientific attainments of the serologist and of his average results.

It cannot be urged enough that the occurrence of a positive W.R. in the serum does nothing more than signify that living spirochætes are in the patient's body. It has not necessarily any bearing upon the question of the diagnosis of the cause of nervous disease. Hundreds of people have a positive serum reaction but are suffering from nervous disease which is not syphilitic. Many people have a negative serum reaction but are nevertheless victims of nervous disease which is syphilitic. It is the examination of the cerebro-spinal fluid (c.s.f.) which alone affords early and absolute detection of syphilitic nervous disease.

For the reason that the W.R. is a qualitative and not a quantitative test a single negative reaction in the serum does not always exclude syphilitis. In cases in which syphilis is suspected the test should be repeated soon after an injection of "606" has been given.

The collaboration of the neurologist is essential in all departments for the study and treatment of syphilis. Every patient who has uncured syphilis should be regarded as a potential candidate for nervous disease and there is no doubt that in many cases of this kind recognition of the possibility of this by the physician and by the patient at the outset would lead to the detection of the condition in the early and curable stage.

Treatment.

With reference to treatment, I am convinced that even now "606" is, as a rule, given in inadequate quantity. I have not met any cases which have tolerated badly large doses of novarsenobillon when they have been given at suitable intervals. On the other hand, cases are seen daily who were given totally inadequate amounts of "606" in the early stages of their disease and who now have nervous lesions. I have given as many as 12 full doses of "914"† at half-weekly intervals to many men with early affections of the nervous system, with the result that in several instances I have been able to watch the W.R. become negative in serum and c.s.f. and remain negative. Later on I shall allude to some of the disadvantages of this intensive treatment.

As regards nervous syphilis, I am convinced that the patient will do well to consult for some years the physician

* The lecture was illustrated by clinical photographs.

† "914" refers to novarsenobillon.

who made and proved the correctness of the diagnosis, for he alone will be the best judge of the results of treatment. In all cases repeated examination of the c.s.f. is necessary.

Outline of the Pathology of Syphilis.

According to McIntosh and Fildes, the customary division of syphilis into three stages is unscientific and generally wrong. All syphilitic lesions contain the *Spirochæta pallida*, and it is around this organism that cell reaction occurs. There is no primary stage. A lesion *may* appear at the point of inoculation after a certain period of incubation, but before this stage is reached the spirochætes are generalised throughout the body. Just as the chancre is the local protective cell reaction, so the rash is the reaction of the tissues against the general infection. In some cases it is the meninges which develop the greatest reaction. These reactions are rarely effective in destroying all the spirochætes, and some penetrate into relatively non-vascular structures, where they may lie dormant for years.

If at a later date these spirochætes become liberated, the surrounding tissues react excessively owing to previous sensitisation at the time of the infection. It is this violent reaction of hypersensitive tissue which characterises the tertiary stage and which forms the only real distinction between it and the secondary stage. In some cases there may be but a small interval of time before sensitisation occurs and secondary syphilis may pass directly into tertiary. Indeed, it is often difficult to say definitely into which stage a lesion should be placed.

Syphilitic inflammation of the nervous system affects chiefly either the interstitial tissue (meninges, vessels, &c.) or the nervous tissue itself (nerve cells, neuroglia). The pathology in the two types is the same, but whereas the former structures are capable of repair, the latter are not, and degeneration occurs. Symptoms in this case are due not to the presence of syphilis, but to the absence of nerve cells and fibres.

The success of treatment depends, therefore, upon the site of the lesion. In syphilis of the interstitial tissue treatment may be expected to cure not only the syphilis but also the symptoms, but if treatment is withheld the disease may spread and involve tissues which are essential to life, and curable conditions will become incurable.

In many cases the precise nature of the lesion is only to be determined by the result of treatment. Early diagnosis and early treatment are therefore essential if success is to be obtained.

DIAGNOSIS OF SYPHILIS OF THE NERVOUS SYSTEM.

It is not necessary to have an abstruse knowledge of neurology to form a fairly accurate opinion in most cases of nervous disease. It is the broad principles of neurological diagnosis which are required and the constant recollection that syphilis is the cause of a large number of cases. An efficient working knowledge of neurological case-taking is unfortunately not too common: probably the medical schools turn out more men who are ill-equipped in this department of medicine than in any other.

I hope to show in this lecture that the outlook of sufferers from early nervous syphilis is now the reverse of dark, provided that doctors are constantly suspicious of a syphilitic basis of the symptoms and provided that they do not rest content until they have *proved* the presence or absence of this disease.

Diagnosis depends upon clinical and pathological investigation. I do not propose to say more about clinical diagnosis than to emphasise the fact that it is, as it must always remain, our chief source of information. Pathology serves to support or disprove it and must not be allowed to do service for it. It must be admitted, however, that some patients have well-marked cerebro-spinal syphilis and yet present no physical signs of disease apart from slight mental peculiarities. These cases are only to be diagnosed by an examination of the cerebro-spinal fluid.

Pathological Investigation.

This comprises (1) examination of the c.s.f. for evidence of inflammation—namely, cells and excess of globulin—and for the Wassermann reaction; (2) the Wassermann reaction of the serum. The tests are given in the order of their importance, for it is the examination of the c.s.f. which alone affords absolute evidence of syphilitic involvement of the nervous system. Before a reliable deduction can be drawn from this examination it is necessary to know what treatment the patient has already received, more especially by "606."

If a case appears to be syphilitic on clinical grounds it is most important not to forsake the clinical evidence merely because the *serum* happens to be negative. It is important, also, that we shall not jump to the conclusion that the serologist is at fault. The serum may give a negative W.R. in the presence of a positive or a negative cerebro-spinal fluid for several reasons, a common one being that the syphilitic lesion is too small to give rise to a positive reaction. In these cases we give one injection of "606" and repeat the test in a week or fortnight. In some instances the W.R. in the serum will now be positive (*provocative reaction*), but it will be negative again in a short time, frequently in the following week.

These patients must be distinguiseed from those with early affections in whom the development of a positive W.R. happens to coincide with the administration of "606."

I have observed this provocative reaction in the serum in six patients. The following is a typical example:—

CASE 68.6.—Patient, aged 32, a naval officer, was found to have tabes dorsalis. He contracted syphilis in 1911 and received two injections of "606" in 1912. On Nov. 4th, 1917, his serum gave a negative W.R. The c.s.f. was positive (4.4.0.0.)‡ and contained a lymphocytosis. The first two of his injections were given on Nov. 15th and 19th (full doses of "914"). On Nov. 21st the serum was completely positive. On Nov. 28th it was again negative.

It does not always happen that treatment will provoke a reaction in the serum. Thus I have notes of five cases in which the serum remained negative in the presence of a positive W.R. in the c.s.f. Four of these patients had tabes dorsalis; the other had syphilitic hemiplegia.

I have seen only one case of provocative reaction in the c.s.f.

CASE 139.6.—Patient, aged 29, a naval officer, was seized with a sudden attack of hemiplegia during the evening of Nov. 26th, 1917. A history of syphilis five years previously was obtained, and for this he had been given one injection of "606." On Nov. 28th the serum gave a strongly positive W.R. The c.s.f. contained 36 lymphocytes per c.mm. and excess of globulin, but the W.R. was negative in all dilutions. He was given a full dose of "914" on Nov. 29th, Dec. 3rd, &c. On Dec. 6th the fluid was positive in 0·8 c.cm. (4.0.0.0.), but on Jan. 4th, 1918, after four injections, it was once more completely negative (0.0.0.0.).

The value of the W.R. in the c.s.f. cannot be exaggerated. When performed by a reliable worker a test which is positive is conclusive evidence of syphilis of the central nervous system. There is one exception to this statement. The c.s.f. is not affected by alterations in the serum unless the pia mater is diseased. In cases of meningitis of any kind, whether syphilitic or non-syphilitic, this membrane is diseased, and in the presence of a syphilitic serum the c.s.f. may give a positive W.R. (Case 138.6).

With a few exceptions a negative reaction in the c.s.f. means that the nervous system is not involved. One of the exceptions has been mentioned already. Others are: (1) early acute meningitis in which a positive reaction has not developed; (2) cases in which a positive reaction has become negative owing to treatment but not permanently so. If treatment is stopped the few spirochætes which are undestroyed may multiply and produce a lesion, and the W.R. may again become positive.

In long-standing cases of tabes dorsalis the spirochætes may die a natural death, and as the disease now depends upon tissue destruction, and not upon active syphilis, the W.R. will be negative in serum and cerebro-spinal fluid.

In a few of my cases the Wassermann reaction was negative in 0·2 c.cm. of c.s.f. but positive in 0·8 c.cm. Thus there is room for error in determining the reaction if the test is performed only with 0·2 c.cm.

An index of the particular pathology of a case is afforded by the celerity with which the W.R. in the c.s.f. responds to treatment. A negative W.R. in the c.s.f. of a case which is looked upon as one of dementia paralytica may be accounted for by confusion between this disease and syphilitic vascular disease. The following is an example of this.

CASE 161.3.—Patient, aged 36, a naval officer, developed a series of delusions during August, 1916. For instance, he asserted that he could see hundreds of submarines at one time, and he imagined that he was receiving trunk calls in mid ocean. On admission to Haslar in August, 1916, his serum was found to be positive. The c.s.f. was not examined.

‡ These figures refer to the strength of the W.R. in the four dilutions of the c.s.f. which have been used for the test. The dilutions are 0·3, 0·2, 0·06, and 0·012 c.cm. The number "4" represents complete inhibition of hæmolysis.

He recovered to some extent, and was sent on leave. He received no special treatment.

In October, 1916, he came under my care. His manner was very strange, he had marked delusions of impending electrocution, and he frequently passed urine into the coal-box. The pupils reacted very sluggishly to light, the ankle-jerks were diminished, and there was patchy blunting to pin-pricks. A diagnosis of early dementia paralytica was made, and he was certified before the c.s.f. had been examined. When this was done, however, it was found to give a negative W.R. in 0·2 c.cm., but it contained 15 lymphocytes per c.mm.

After receiving three full doses of kharsivan the patient improved out of all knowledge, and he was mentally normal. After spending three months at the asylum at Great Yarmouth he was discharged in February, 1917, and I was told that he had been in good mental and physical health during his stay there.

Both serum and c.s.f. may readily be obtained post mortem from patients who die before these fluids have been examined.

Excess of Globulin in the Cerebro-spinal Fluid.

An important feature of the test for excess of globulin lies in the fact that it can be performed at the bedside. Also it affords valuable confirmation of other tests. A positive test, though sometimes it may be very slight, can nearly always be demonstrated in the presence of a pleocytosis in untreated cases. I can recall but one man out of several hundreds in which this was not the case. After treatment the globulin may disappear before the cells.

Excess of globulin in the absence of a lymphocytosis has been demonstrated in only two of all my syphilitic cases. In one of these, a case of syphilitic cerebral thrombosis, the fluid gave a completely positive W.R. in all dilutions, but it contained only 4 lymphocytes per c.mm. In the second case there was excess of globulin in an otherwise normal and completely negative fluid. The man had syphilitic vascular hemiplegia.

In a case in which syphilitic disease was suspected the discovery of a great excess of globulin in the c.s.f. but a complete absence of cells enabled us to diagnose correctly a tumour compressing the cord. (Case 250.4.)

In view of these examples it is difficult to regard excess of globulin as being always indicative of a general meningeal inflammation.

I have been much struck by the value afforded by the confirmation of one test by another. In busy practice this check upon one's observations is of the greatest importance, for, as Kaplan has put it, the serologist must not forget that it is just as much his duty to protect a non-syphilitic patient from a wrong diagnosis as it is to detect every case which is syphilitic.

Dextrose in the Cerebro-spinal Fluid.

I have found the test for dextrose with Fehling's solution of less assistance in the diagnosis of chronic meningitis than in that of acute conditions. In the few cases of acute meningeal affection in which I have examined the c.s.f. for this sugar no reduction of the copper has occurred, but in several cases of syphilitic meningitis (dementia paralytica, &c.) a strong reduction has occured, in spite of the fact that the fluid has contained a lymphocytosis and excess of globulin.

To perform the test the Fehling's solution should be diluted with water about nine times.

Colouration of the Cerebro-spinal Fluid.

Yellow colouration of the fluid has been noticed in two cases only. In one of these, a case of tumour of the mid-brain, the fluid was constantly clear in the early stages, but it was coloured on repeated occasions during the last month of life. (Case 30.5.)

In the second case (Case 93.6) the fluid was not only yellow, but it clotted spontaneously and very rapidly. The man had a gummatous meningitis low down in the spine. After two weeks' treatment with "914" the fluid was clear and did not clot.

In the only other case of spontaneous clotting of c.s.f. which I have seen a tumour of the dorsal cord was diagnosed and removed. This fluid appeared to be included rightly among those described under the name "xanthochromia with massive coagulation," but in my first case the colour was that of normal urine.

Technique of Lumbar Puncture.

In regard to the technique of lumbar puncture I will confine my remarks to emphasising the very real need that the operation shall be painless, most especially in view of the fact that further examinations of the cerebro-spinal fluid are necessary in all syphilitic cases in order that the value of treatment may be assessed correctly. For this reason I do not consider that the operation should be performed by the inexperienced.

During 18 months at Haslar I have performed the operation upon 426 patients, in many cases several times. Post-operative sequelæ have occurred in a few cases only, and these, as a rule, were those in which the fluids were healthy.

In the majority of cases the various investigations of the fluids, with the exception of the W.R., have been made my myself. All the Wassermann reactions have been performed by Staff-Surgeon Fildes. In each case it is probable that the results of a series of tests have gained in value from being performed under these conditions.

With a little experience cell counting is perfectly easy to do. I have used throughout a simple method which was shown to me by Surgeon S. L. Baker. The *only* requirements are an ordinary Thoma-Zeiss hæmocytometer, a bottle of methylene blue, a graduated pipette, and a microscope with a 1/6 inch objective and fitted with some form of mechanical stage. A special counting chamber is not necessary. The time need not be more than five minutes from the start of the operation to the completion of the examination of the fluid both for excess of globulin and for an accurate count of the cells. In my experience more than six lymphocytes per c.mm. is almost always pathological. In a large number of my healthy fluids no cells were present.

The technique of lumbar puncture and cell counting is described in detail, together with that of intravenous injections, in the *Journal of the Royal Naval Medical Service* for October, 1917 (Hildred Carlill, Fildes and Baker).

CLASSIFICATION OF SYPHILITIC NERVOUS DISEASES.

The following classification is based upon the pathological work of Fildes and McIntosh, published in conjunction with the clinical investigations of Head and Fearnsides.

1. Lesions of the secondary period.
   - A. Early:
     1. Acute—parenchymatous encephalitis or myelitis.
     2. Subacute—meningitis.
   - B. Later: Interstitial encephalitis or myelitis (secondary meningo-vascular syphilis).
2. Lesions of the tertiary period.
   - A. Interstitial encephalitis or myelitis.
   - B. Parenchymatous encephalitis or myelitis (syphilis centralis).

There are many cases which lie between late secondary and tertiary stages, and many combine the features of both interstitial and parenchymatous lesions. The precise allocation of any case depends upon the opinion and the experience of the physician and upon the accuracy of the history. In meningo-vascular lesions the W.R. of the cerebro-spinal fluid can, as a rule, be modified fairly rapidly by treatment, but when parenchymatous tissue is affected and hypersensitive cells have reacted with great intensity to the spirochætes this is rarely the case. In many instances the essential pathology, and therefore the prognosis, can only be determined by the results of treatment, and for this reason no case of syphilitic nervous disease should be denied treatment.

The early acute lesions of the secondary period are probably more frequent than is recognised. The diffuse involvement of nerve cells leads rapidly to death, and it is probable that in many cases no history is forthcoming to suggest the nature of the illness.

Subacute symptoms, such as headache and irritability, are common during the early secondary stage, and it is likely that the meninges are involved in these cases. It has been said that physical signs of disease can be detected in all patients in whom the fluid shows evidence of meningitis, but in several cases of my own the most careful examination on repeated occasions did not reveal any sign of disease.

The later lesions of the secondary period may be looked upon as interstitial entirely. Frequently they are associated with localising signs, such as cranial nerve palsies, and these I regard as blessings in disguise, as, on their account, men are usually brought under early observation.

MENINGO-VASCULAR SYPHILIS OF THE SECONDARY PERIOD.

Among my cases of nervous syphilis there have been 19 in which the infection could be traced back not more than 12 months. In most of the cases some form of "606" had been given originally but in very small quantity. Four of the men had hemiplegia, and in several of the others one or more cranial nerves were paralysed.

Of these 19 cases a positive W.R. in the serum has been converted by treatment into a negative reaction in 6, and in 3 of these the reaction has remained negative over a period of many months. The fate of the others is not known.

A positive W.R. in the c.s.f. has been made negative also in 6 cases. These include two from the above list.

There can be little doubt that the same result has been obtained in some of the remaining cases.

It is not unusual to find between 1000 and 2000 lymphocytes per c.mm. in this type of case. Polymorphonuclear cells are commonly found, but generally in smaller numbers than the lymphocytes. It is often the case that they are absent altogether when the clinical aspect of the patient suggests that they will be abundant.

Cases Illustrating the Value of Novarsenobillon.

The following is an example of the danger which a patient runs when insufficient treatment is given and when the case is regarded as cured directly the positive serum reaction is made negative. Fortunately the patient had a visible palsy, and attention was called to his condition before the disease had progressed too far.

CASE 191.4.—Patient, aged 30, a stoker, developed a chancre in November, 1916; this was followed by a rash. During January, 1917, he received at Haslar three injections of "914" in half-doses. The serum remained positive, and he was told to take mercury pills and to have his blood tested again in April. On April 4th the serum, tested at Haslar, was negative. The man was in good health, and he was told that he was cured.

Two days later—namely, on April 6th, 1917—he developed severe pain over the left side of the head, and on the following day, April 7th, the left side of the face was paralysed.

He was readmitted to Haslar on April 14th and came under my care for the first time. There was complete palsy of the seventh and eighth cranial nerves on the left side. The nervous system otherwise was normal. The serum gave a positive W.R. The c.s.f. was negative in 0·2 c.cm. but positive in 0·8 c.cm. There was great excess of globulin in the fluid, and 100 lymphocytes and 6 polymorphonuclear cells were counted per c.mm.

By May 24th he had received six further injections of "914" in full doses at weekly intervals. His hearing had nearly recovered and the facial palsy was much improved. The W.R. was now negative in the serum and in all dilutions of the c.s.f. There were 8 lymphocytes per c.mm.

At the end of July, when he was seen again, his paralyses were completely cured and he felt strong and well.

On Dec. 14th the W.R. in the serum and in all dilutions of c.s.f. was negative still, and the fluid contained no cells and no excess of globulin. The man felt well in every way. There was no motor weakness and no abnormal sensory sign, either objective or subjective, but the ankle-jerks were absent.

The patient may be regarded as cured, I think, but with the reservation that he has peripheral neuritis. This, however, is associated with no symptoms whatsoever and there is no disability. The man has promised to report in four months' time for a further examination and for further tests upon the serum and cerebro-spinal fluid.

The great importance of examining the cerebro-spinal fluid in unexplained cases of headache is well illustrated by the following story.

CASE 210.4.—Patient, leading seaman, aged 31, was admitted to a surgical ward on May 9th, 1917, on account of severe headaches during the previous three weeks. He ascribed his symptoms to an injury caused by an oilcan falling on to his head and inflicting a scalp wound. No sufficient surgical cause for his condition was detected, however, and by the kindness of Staff-Surgeon A. Sanders he came under my care.

The man admitted having had a sore early in December, 1916, and for this he had been given six injections of galyl at Plymouth during the following six weeks. He was then discharged as cured. The most careful examination disclosed no clinical evidence of disease, but the man was drowsy and obviously ill. On May 10th the c.s.f. contained 586 lymphocytes per c.mm. and gave a completely positive W.R. in 0·2 c.cm. The W.R. in the serum was positive also.

The patient's symptoms were much improved by his first injection of "914," 0·6 g., and on May 24th, after three further injections of full doses, the c.s.f. contained 174 lymphocytes per c.mm. There was great excess of globulin and the W.R. was positive in three out of four dilutions of the fluid (4.4.4.0).

On June 22nd the man had received 11 full doses of "914," the injections being given at half-weekly intervals. The W.R. was positive still in the serum but negative in the c.s.f. in all dilutions (0.0.0.0). The fluid contained 58 lymphocytes per c.mm. and an excess of globulin. The man went on leave on July 1st, looking and feeling perfectly well.

The temperature after the first injection went up to 99° F. Otherwise it was normal throughout.

The man was seen again on Oct. 29th and was found to be perfectly well. He had been at full duty in a battleship during the past three months. On examination his ankle-jerks were found to be absent as the result of arsenical neuritis, but he had no other objective signs of disease and no subjective symptoms whatever. The W.R. was negative still in the serum and in all dilutions of c.s.f. (0.0.0.0). The fluid contained 4 lymphocytes per c.mm. and no excess of globulin.

This man illustrates well the frame of mind in which we should always endeavour to put our patients. He placed himself unreservedly in my care from the start, and when the time came for his four days' leave from the Grand Fleet he came to the hospital and asked me to examine his cerebro-spinal fluid. No physician can wish for a better testimonial.

In work of this sort immediate treatment is essential. It takes a few moments only to perform lumbar puncture and establish the existence of a pleocytosis. This, in cases such as those I have described, makes a diagnosis of syphilitic meningitis almost certain and there need be no delay in commencing treatment merely because the result of the W.R. is not yet known. It is well to collect the serum for examination before treatment is started. By means of Wright's blood capsules this is simplicity itself. I have no evidence that injection of salvarsan does harm in those cases in which the diagnosis of syphilis is not confirmed.

A patient is in hospital now who was admitted in a state of semi-consciousness and completely aphasic. Surgeon A. Gow asked me to see the man with him. The history did not help us, but a few signs of hemiplegia were detected. A diagnosis of meningo-vascular cerebral syphilis was made and confirmed so far by the discovery of a pleocytosis and excess of globulin in the c.s.f. By the day on which the W.R. in the serum and c.s.f. was known the man had received two full doses of "914" and he was sitting up and talking.

In a number of patients the W.R. in the c.s.f. is negative in 0·2 c.cm., but positive in larger quantities of fluid. It is important to recognise this fact. Probably some of the fluids which are reported to be negative in the presence of a pleocytosis are examples of this. In a few patients, however, treatment converts a positive W.R. in the c.s.f. into a completely negative reaction before the cells have all disappeared.

MENINGO-VASCULAR LESIONS OF THE TERTIARY (OR LATE SECONDARY) PERIOD.

The disease at this stage is frequently limited to the lymph-vascular structures, but associated lesions of parenchymatous tissues may occur, due to pressure of gummatous exudates or to diffusion of toxins. The syphilitic process is focal, due to spirochætal activity in or around the wall of a blood-vessel. Numerous foci which are situated in proximity to one another will give rise to a diffuse lesion. The term "gummatous meningitis," however, is not always correctly applied, for, owing to extension of inflammation along perforating vessels, the vessels within the brain or spinal cord may become involved while the meninges escape.

Forty-six cases of tertiary meningo-vascular syphilis have been observed, the symptoms occurring within a period after infection which has varied from five to 30 years. In many cases parenchymatous lesions were associated with the interstitial affections. In several instances the date of infection could not be determined.

Two patients died while undergoing treatment (Cases 37.5 and 136.5). They are referred to again in the remarks on treatment. Another man was admitted unconscious and died within 24 hours. It is possible that immediate treatment might have saved his life, but it was not until death had occurred that the serum and c.s.f. were examined and found to give positive reactions for syphilis (Case 205.4).

Many of my cases had hemiplegia from syphilitic endarteritis and in nearly all of them an associated meningitis was discovered pathologically. It is noteworthy that of 37 consecutive cases of hemiplegia due to all causes, of which I have complete notes, 21 were proved to be due directly to syphilis.

I have been struck by the number of cases of syphilitic hemiplegia which, on examination, have proved to be really diplegic. The patient has symptoms plus signs on one side of the body, signs only on the other.

Of the 46 cases, about 30 made rapid and very considerable improvement under treatment. It is remarkable how rapidly the signs of insanity of this type of disease clear up. The following two cases had no mental signs, but they are quoted to show the value of treatment.

CASE 14.4.—Patient, aged 46, developed hemiplegia of face, arm, and leg during November, 1916, and he was admitted on the following day. He contracted syphilis at the age of 21, and 20 years later he had a large gumma on the thigh.

On admission the serum and c.s.f., in 0·2 c.cm., gave a completely positive W.R., and the fluid contained 46 lymphocytes per c.mm. During November he was given two full doses of kharsivan and one of "914." In May, 1917, he came up to see me. There was no weakness whatever on the previously affected side, and he was able to do hard work. The serum gave a positive W.R. still, but the test in the c.s.f. was negative in all dilutions (0.0.0.0). The fluid contained 10 lympho-

cytes per c.mm. The opportunity was taken to give him a further injection of "914."

CASE 93.6.—Patient, aged 35, yeoman of signals, was seized early in September, 1917, with a first attack of lumbar pain. This soon extended down the right leg, and he was treated for sciatica until a month later, when he developed retention of urine and incontinence of fæces.

Fleet-Surgeon F. H. Nimmo, R.N., under whose care the patient had come, was kind enough to ask me to see the man on Oct. 15th, 1917, and I came to the conclusion that he had a tumour compressing the cord low down. The W.R. of the serum was negative, but the c.s.f. contained 364 lymphocytes and 116 polymorphonuclear cells per c.mm. and gave a positive W.R. in all dilutions (4.4.4.4). The c.s.f. was pale yellow and clotted spontaneously.

After the first injection of "914" the W.R. of the serum became positive. On Nov. 1st, 1917, after three full doses of "914," the W.R. of the c.s.f was positive in the largest quantity only of the fluid (4.0.0.0), and the cells were reduced to 42 lymphocytes per c.mm. The fluid did not clot.

On Nov. 26th, after a total of six full doses, the c.s.f. was perfectly clear, and contained a slight excess of globulin and 20 lymphocytes per c.mm. The W.R. in the serum was positive still, but in the c.s.f. it was negative in all dilutions (0.0.0.0).

On Dec. 15th, 1917, the patient was sent home. He had received 7½ full doses of "914," and was very markedly improved in health.

Cases are seen sometimes which do not really fall into any of the groups of nervous syphilis which I have mentioned. Seven cases of the sort have been observed. For example, one man had night-blindness and lightning pains in his legs, and his only physical signs of disease were optic atrophy and an extensor plantar response on one side. Both serum and c.s.f. gave a positive W.R., and the latter contained 42 lymphocytes per c.mm. This was a case of syphilis centralis. Others, no doubt, are instances of early tabes dorsalis. One patient with syphilitic amyotrophy and Argyll Robertson pupils made very great progress under treatment with "914."

PARENCHYMATOUS SYPHILIS OF THE TERTIARY PERIOD (SYPHILIS CENTRALIS).

This pathological group comprises the cases which formerly were known as parasyphilitic. These are tabes dorsalis, tabo-paralysis, and dementia paralytica. Certain other clinical conditions should also be included under this heading. The disease process is the same in all of them, but in one case it is the spinal cord and in the other the brain which is affected most. The condition is due to active syphilitic disease and not merely to the degenerative sequelæ of syphilis.

In dementia paralytica an exacerbation of the virus already in the brain leads to an immediate reaction—namely, an inflammation of nerve cells and neuroglia. The reaction, however, is abortive, and as the intoxication is greater than the cells can sustain, a degeneration occurs shortly. The disease is a tertiary syphilitic parenchymatous encephalitis, and, similarly, tabes dorsalis is a tertiary syphilitic myelitis.

These diseases result from a distribution of spirochætes which is more or less diffuse within the nervous tissue, as opposed to the gummatous lesions which are due to an inflammation located in the interstitial tissues.

The progressive character of syphilis centralis depends upon a continuation of the syphilitic process in spite of treatment, and not to a progressive primary degeneration of the neurons. Treatment is ineffective in resolving the inflammation because the drugs employed in the blood-stream are unable to pass from the capillaries into the nervous substance in order to destroy the spirochætes.

Tabes Dorsalis.

My series of cases of tabes dorsalis consists of 72 patients. Their ages varied between 21 and 65 years. Nine patients were aged 31 or under.

In six cases neither the serum nor the c.s.f. was examined. Of the remaining 66 cases the c.s.f. contained a lymphocytosis and the W.R. was positive in serum and fluid in 51, all except 15. Of these 15 patients the following particulars are of interest:—

Four, prior to treatment, had a negative W.R., which was confirmed, in the serum, in the presence of a c.s.f. which was positive and which contained a lymphocytosis.

Two patients had a negative serum which was provoked by treatment into a temporary positive W.R. One of them had a completely negative c.s.f. in all dilutions and no cells (Case 39.6). The other patient had a positive W.R. in the c.s.f. (4.4.0 0) and a lymphocytosis (Case 68.6).

Four patients had a positive serum but a c.s.f. which was negative in all dilutions and which contained no excess of cells. They had received no treatment by arsenical compounds, yet active disease in the nervous system had been arrested.

Five patients had a negative serum and a negative c.s.f. in 0·2 c.cm., but in two of them there was a small lymphocytosis, 10 and 48 cells per c.cm. respectively. It may be that in larger quantities of fluid the W.R. would have proved to be positive. In another of them, the only patient of my whole series who had no cells whatever in his fluid, there is evidence that both serum and c.s.f. gave a positive W.R. four years ago when the patient was under the care of Dr. Henry Head. One of the five patients has a negative serum and a c.s.f. which is negative in all dilutions and which contains six lymphocytes per c.mm. He has had no modern treatment.

Of the whole series there were 4 cases, of those in which the c.s.f. was tested in four dilutions, which gave a positive W.R., prior to treatment, in the largest quantity of fluid only—namely, 0·8 c.cm. (4 0.0 0).

In several instances the W.R. has been found to be positive at Haslar, whereas it was reported to be negative at other hospitals. The results of the W.R. given throughout this paper refer, in every instance, to tests performed in the laboratory at Haslar by Staff Surgeon Fildes.

Four of my patients had Charcot's disease of joints. Two patients had been subjected to laparotomy for symptoms which were due to their nervous disease. In two cases the pupils were absolutely normal. One patient had bilateral nerve-deafness as his only symptom. Another had suffered for months from severe perineal pain before the cause of his condition was discovered. Another patient was sent to hospital with the diagnosis of intestinal cancer on account of frequent attacks of complete constipation, which lasted as long as 10 days. On two occasions he had been given chloroform for the purpose of having a fæcal impaction removed.

One of the patients was a lady of 37. Her serum and c.s.f. gave positive reactions. The eldest of her three children, a boy of 13, has dementia paralytica. The serum of the two other children, and the serum and c.s.f. of their father, is negative.

In 48 of the 72 cases both knee-jerks and both ankle-jerks were absent. In 13 cases the knee- and ankle-jerks were all present. In 4 cases both knee-jerks were normal, but the ankle-jerks were absent. In only one case were the knee-jerks absent, but the ankle-jerks present.

As regards the sensory system, I have been struck with the number of patients, who show an absolutely normal cutaneous sensation, but in whom deep analgesia is marked.

Improvement in the symptoms, coincident with treatment, has occurred in the majority of patients, and many have written to say that life is again worth living.

The cell content of the fluid, prior to treatment, has varied from 0 to 338 lymphocytes per c.mm. A lymphocytosis of more than 100 cells per c.mm. has been observed in only 16 cases.

All the men were at full duty, ashore or afloat, until their admission to hospital. It is difficult to be dogmatic on the point, but the evidence points to the fact that the war has precipitated the symptoms in some cases.

The following cases are of special interest as regards the beneficial effects of treatment in tabes dorsalis.

CASE 171.3.—Patient, aged 27, was admitted to Haslar under the care of Temporary Surgeon Oliver Gotch, R.N., during October, 1916, on account of indigestion which he had suffered since he was 19 years old. For the past six months he had been troubled also with occasional shooting pains in the legs.

He gave a history of gonorrhœa at the age of 17 and of having had a chancre when he was 21. He received 12 injections of mercury for this and for 12 months he took mercury pills. In 1911, as his serum gave a positive W.R., he was given a solitary injection of "606."

In 1914 he was subjected to laparotomy on account of his dyspepsia. His appendix was removed, but no improvement in his symptoms resulted.

On examination I found that the pupils were unequal and fixed to light. The knee-jerk and ankle-jerk on the left side were absent. The central nervous system otherwise was normal. The W.R. in the serum was negative on two occasions, but the c.s.f. gave a positive reaction in 0·2 c.cm. and contained 26 lymphocytes per c.mm.

On Nov. 20th, 27th, and Dec. 4th, 1916, he was given a full dose of "914." In December, 1916, he was married.

In April, 1917, he was found to be very much improved and he could eat anything without discomfort. The shooting pains worried him no longer. The left knee- and ankle-jerk were now present, but very sluggish. The W.R. in the serum was negative still. In the c.s.f. the reaction was weakly positive in 0·8 c.cm., but negative in the three other dilutions (2.0.0 0). There were 10 lymphocytes per c.mm. in the fluid.

He was given a full dose of "914" on April 18th and 23rd, 1917.

On August 19th, 1917, he was seen again. He said that he never required to consider what he ate. He had lightning pains occasionally,

but these were better than for many years. The left knee- and ankle-jerks were less brisk than on the right side, but considerably more active than formerly. The W.R. in the serum was negative. The c.s.f. gave a negative W.R. in all dilutions (0.0.0.0), and contained no cells. He was given a further dose of "914," and I hear that he remains in very good health.

CASE 61.4.—Patient, aged 41, a naval officer, was referred to me by Staff-Surgeon R. Parnell, R.N., during January, 1917, on account of "failing vision" for five or six years, and of shooting pains of more recent date. He gave a history of syphilis contracted at the age of 23. On examination I found that he had most of the classical signs of tabes dorsalis.

The W.R. was positive in serum and c.s.f. (0·2 c.cm.), and the fluid contained 30 lymphocytes per c.mm.

Between January and July, 1917, he received six injections of "914." On July 19th, 1917, the W.R. in the c.s.f. was completely negative in all dilutions (0 0 0.0), and the cells had decreased to 12 per c.mm.

On Oct. 8th, 1917, after 11 injections, the W.R. was negative in the serum and it was still negative in the c.s.f. (0.0.0.0). The fluid contained four lymphocytes per c.mm. The patient said that he had improved very much, more especially in the following particulars: he had had no pains since treatment was commenced except for "two very slight twinges"; he was far less easily fatigued and there was less straining to pass water; his memory was greatly improved and he was no longer unsteady in the dark.

Dementia Paralytica.

Sixty-four cases have been under observation, and of these 13 were examples of tabo-paralysis; some or all of their tendon reflexes were absent. In all except two of the other cases of dementia paralytica the tendon reflexes, notably those in the lower extremities, were exaggerated. In the two they were normal. In no case was the plantar response extensor except during or for a short time after a fit.

Of the whole series of 64 cases the serum gave a completely positive W.R. in every one, and in every case which was lumbar punctured (60) the c.s.f. gave a positive W.R. and contained a lymphocytosis. Four patients were not lumbar punctured. I have found it unusual for the c.s.f. to be under increased pressure. The lymphocytes, estimated prior to treatment, varied from 12 to 160 per c.mm., but in only 6 cases did the number exceed 100 per c.mm.

The age of the patients varied from 23 to 50, with the exception of two patients, aged 13 and 19 respectively, instances of juvenile general paralysis. The boy, aged 13, is the eldest of three sons of the tabetic mother to whom I have referred already. I was able to examine his serum and c.s.f. through the kindness of Dr. H. Devine, of Milton Asylum. 16 patients were not older than 31 years.

Twenty-five patients were certified and sent to asylums. The rest went home, but some of them have since been certified. 17 of the patients are already known to be dead. Of these, 11 received no treatment by "606." In one patient the *Spirochæta pallida* was demonstrated in the brain tissue under the dark-ground illumination by Surgeon Baker.

In a few cases the differential clinical diagnosis between general paralysis and traumatic neurasthenia was very difficult.

Definite physical and mental improvement occurred in many of the patients during the course of treatment. No doubt some of them suffered more from meningo-vascular syphilis than from the lesions of syphilis centralis, and consequently reacted better to treatment. Pathological improvement is shown, as in tabes dorsalis, by the decrease in the cell content, and by modification of the W.R. in the c.s.f. Decrease in the number of cells always occurs after "606" is given, but neither this nor a modification of the W.R. is associated necessarily with any amelioration of the mental condition.

From my own experience I think that every patient should be given "606." Many of my cases have improved very greatly, but it is not suggested that a practically hopeless prognosis cannot be given in certain instances. The truth appears to be that treatment often is the deciding factor in the question of accurate pathological diagnosis. It may be anticipated with confidence that, when the diagnosis of neurological syphilis is made in its early stages, incurable lesions will become far less common than is the case at present.

TREATMENT OF SYPHILIS OF THE CENTRAL NERVOUS SYSTEM.

At the present time treatment by the new remedies has usurped entirely the place of those on which our fathers relied. This is not to say that there is no place for the former drugs, but they are unquestionably of secondary importance. Some physicians combine the old drugs with the new, and frequently I do so myself, but I am not aware of any evidence which shows that this is necessary.

The drugs of which I have had experience at Haslar are kharsivan, galyl, and the novarsenobillon ("914" or N.A.B.), prepared in England by Messrs. May and Baker, of Battersea. Kharsivan, which is said to be the English equivalent of the original salvarsan, is a thoroughly effective therapeutic agent, but the ease with which "914" is administered and the fact that its efficiency is certainly not less than that of kharsivan has brought it greater popularity in my practice.

In nearly 2000 injections of "914," in the majority of which full doses were used, I have had no anxiety of any kind. I can say the same with regard to galyl, of which I have had some experience, but in the case of galyl freedom from anxiety has appeared to be the result of the therapeutic weakness of the drug. In my own practice galyl was given a good trial, but I formed the opinion that it is a very inferior drug and I abandoned its use. There is no doubt that symptoms may clear up rapidly under galyl—and this is its danger in my opinion—but improvement appears to be permanent in few cases. The following case, one out of many of my own, illustrates what I mean:—

CASE 80.6.—Patient, aged 32, a stoker, developed a sore on the penis during October, 1916. The sore disappeared without treatment and two months later a rash was noticed. During December, 1916, he was given three injections of galyl at intervals of a week in a hospital ship. After the first of these the rash went away. In April, 1917, headaches started and a further injection of galyl was given in another hospital ship. For some weeks the man was fairly well, but in June, 1917, the headaches recurred with great severity. In September, 1917, he developed a hemiplegia.

On admission to Haslar in November, 1917, the c.s.f. contained excess of globulin and 272 lymphocytes per c.mm. The W.R. of the fluid was positive (4.4.0.0), but in the serum it was negative. This was confirmed twice during treatment. After six full doses of "914" the man felt better in every way than at any period during the past 12 months.

TREATMENT BY INJECTIONS OF NOVARSENOBILLON.

The inconveniences of an unsuccessful injection are no more than a slight bruising of the skin. I do not refer to the results of the drug coming into contact with the tissues, for if the following method of giving injections is adopted this never occurs. Use a 20 c.cm. glass syringe on which is mounted a short length of rubber tubing bearing the needle. Dissolve the drug in the syringe, insert the piston, and invert the syringe. Press home the piston until the solution reaches to the commencement of the tubing and no further. If the venepuncture is unsuccessful none of the solution enters the tissues because the needle is empty. Directly the vein is successfully punctured bubbles of air are forced back into the syringe in front of the blood. When the injection is completed this air once again occupies the tubing. Needles are best kept in olive oil in a porcelain dish. They can be sterilised before use by heating the oil to 140° C.

Nothing to merit the name of "complication" has occurred in my wards after treatment with "914," except in a few cases in which I have used intensive treatment. I shall refer to these presently. Certain inconveniences arise at times. Thus, in a few cases a rash has appeared for a short time, and in one patient herpes in the area of distribution of the upper cervical roots was observed (Case 164 5). This appeared after the third injection. Treatment was continued without interval and without further trouble. None of my patients have complained of the ethereal smell which is associated sometimes with the intravenous use of certain other arsenical compounds.

In some cases there is a smart pyrexia after the injection. This often does not occur until after the third or fourth injection, and I have found it impossible to prophesy in which patient this may be expected.

With a few exceptions my neurological patients have received a full dose (0.9 g.) to start with, and this has been followed by a course of six or eight full doses, each given at half-weekly intervals. This line of treatment has applied to both early and late syphilis of the nervous system.

If the patient can remain under observation for a longer period than is usually possible in hospital, I prefer to start with a half dose and to continue with full doses at an interval of a week for six or eight injections. After this I like to give a full dose once or twice a month until the W.R. of the c.s.f. becomes negative. When this result is obtained a further full dose is recommended, say, six times a year, until the W.R. of the c.s.f. has been proved by the same observer to remain negative for 12 months. If the W.R. of the serum is still positive treatment should be continued.

In cases of long-standing disease I allow the patient to get up an hour or so after his first injection. After subsequent injections he gets up at once. In early cases of acute

nervous disease the patient remains in bed for the rest of the day.

I make it a rule to obtain the coöperation of the patient before injections are commenced. There is never any difficulty in this, for the results of treatment are so striking in most instances that the ward is always full of the atmosphere of recovery.

I have no personal experience of danger to the patient from the use of "914," but we are always prepared for emergency.

Intensive Treatment.

In hospital practice, where the chances of seeing the patient again are rather remote, there is a temptation to give a large number of injections in a short period. The largest number of injections of full doses of "914" which I have given at intervals of three days is 14. The patient was a man of 47, suffering from early tabes dorsalis (Case 139.5). The injections were well tolerated and three months after his discharge the man wrote saying that his health was very good.

The manufacturers inform me that "914" contains 20 per cent. of inorganic arsenic. Fourteen full doses contain, therefore, 2·52 g. of arsenic, the equivalent of 37·8 gr. I recognise that this dose, given over a short period of seven weeks, is excessive and unjustifiable except in rare instances.

Complications of intensive treatment.—In more than 30 cases I have given from 9 to 12 full doses of "914" at the rate of two injections a week. In one case injections were given on two consecutive days. In the vast majority of patients these large doses were well tolerated; in fact, the following case proved to be the solitary exception. Nevertheless, with increasing experience, I think that few cases require more than six or eight injections at a course.

CASE 3.6.—Patient, aged 43, was admitted under my care on July 28th, 1917, suffering from mental confusion and delusions of various kinds. No evidence of organic disease was detected. The W.R. of the serum was positive and the c.s.f. gave a positive reaction in 0·8 c.cm. (4.2.0.0) and contained 27 lymphocytes per c.mm. On Sept. 10th, after 10 full doses, he developed an acute dermatitis. There were no signs or symptoms of neuritis except that the ankle-jerks were lost. During the course of the dermatitis towards complete recovery the man lost all his delusions and became mentally normal. On Oct. 25th he was invalided. His physical and mental health were normal. The ankle-jerks had not returned. In December he wrote to say that he continued in good health except that he had slight numbness of the hands.

In the following case it is probable that treatment directly hastened death:—

CASE 136.5.—An officer, aged 38, was admitted on June 26th, 1917, suffering from absolute middle-ear deafness on both sides, together with bilateral hemiparesis and severe mental dullness. All the tendon reflexes were grossly exaggerated, and the plantar responses were extensor in type. The serum gave a positive W.R. The c.s.f. contained 32 lymphocytes per c.mm. and gave a positive W.R. in all dilutions (4.4.4.4). On August 5th he had received 9 full doses of "914." The general condition was somewhat improved. The c.s.f. contained 6 lymphocytes per c.mm., and gave a negative W.R. (1.0.0.0). On the 17th the knee-jerks were still much exaggerated, but the ankle-jerks were absent. The plantars were extensor. By Sept. 8th the arms and legs were very weak and all tendon reflexes were abolished. Cutaneous sensation was normal. On the 25th the patient lost consciousness and he died two days later. At the autopsy an extensive subdural hæmorrhage over the left side was found. There was no evidence pointing to this during life. It is probable that this was a manifestation of arsenical poisoning. There was diffuse softening of brain substance on each side in the region of the basal ganglia. This was caused by syphilitic vascular disease and accounted for the bilateral hemiparesis.

Of the patients who received more than nine full doses at half-weekly intervals six have been seen recently. In each one the ankle-jerks were absent, whereas they were normal when the patients were discharged from hospital. Three of these men, seen four to six months after the last injection, complained of nothing of any sort. The loss of the ankle-jerk was detected because it was specially looked for. Of the three other cases two had experienced slight tinglings in the soles and finger-tips for a few days. No objective signs of disease were detected. The third case was readmitted with slight weakness of the extensors of an ankle joint and a little cutaneous anæsthesia around the feet. He made a good recovery.

I have heard recently from nine patients who had, on the average, nine full doses from two to six months ago. They say that they have had no subjective sensations of any kind. I have not yet received replies from the other patients.

From these observations it is clear that treatment by arsenical preparations should always be preceded by a detailed neurological examination, so that evidence of neuritis, which may exist without any symptoms, may be detected promptly.

I have met with no case which has presented any contra-indication to the use of arsenical compounds. In neurological work I start treatment immediately my clinical diagnosis is supported by positive tests in the c.s.f., without waiting for the result of the W.R. in serum or fluid. Conditions of unconsciousness have proved themselves to be no contra-indication to immediate treatment.

I do not admit that there is any evidence that treatment hastens death in cases of dementia paralytica, though this is maintained by some.

Treatment by intrathecal injections of mercuric chloride.—I have employed this method of treatment in two cases of dementia paralytica and in two cases of secondary syphilis of the cord, using doses of 1/25 gr. or 1/50 gr. dissolved in 10 c.cm. of ox serum. In three of the four cases a vigorous reaction occurred after each injection, the temperature rising within the hour and reaching rapidly a maximum of 103° F.

I have not had sufficient experience of this form of treatment to make my opinion of its clinical worth of any value, but I am disposed to think that it is unlikely to have any great popularity.

I have not used intrathecal injections of salvarsanised serum at Haslar. My experience of it before the war did not convince me that it had any advantage, to the patient, over intravenous injections of salvarsan.

I have no experience of other compounds.

CONCLUSIONS.

1. The possibility of a syphilitic basis should be considered in every case of nervous disease.

2. Nervous syphilis can be proved by examination of the c.s.f. The examination of the serum, whether the W.R. is positive or negative, is of little value in the diagnosis of these cases.

3. Provided that the diagnosis is made early, and prompt treatment given in adequate quantity, syphilis of the nervous system appears to be curable in very many cases.

4. The real result of treatment can only be determined by repeated examination of the c.s.f., hence the absolute necessity of painless lumbar puncture.

5. Cases in which this operation has been contra-indicated have not been observed.

6. Some cases of curable meningo-vascular syphilis are diagnosed as incurable dementia paralytica, and treatment is withheld. Often the precise diagnosis can only be made by watching the result of treatment; therefore all cases should have treatment.

7. Even in some cases of long-standing tabes dorsalis the syphilis appears to be entirely curable by treatment, and in nearly all cases symptoms can be greatly alleviated by "606."

8. Novarsenobillon, in my hands, has proved a safe and most efficient remedy against the protean ravages of the *Spirochæta pallida*.

9. Galyl is not recommended.

10. The outlook of sufferers from early neurological syphilis is very bright, and will be brighter still when the general standard of knowledge of neurological diagnosis is less inadequate than it is to-day.

11. If the profession and the public seize and apply our present knowledge of syphilis it is not too much to hope that future generations of students will learn of tabes dorsalis and dementia paralytica only from the text-books.

12. Abolition of the ankle-jerks is an early sign, and often the only one, of arsenical neuritis, and may be demonstrated in the absence of any subjective symptoms.

For permission to deliver this lecture I am indebted to the Medical Director-General of the Navy, Sir W. H. Norman, K.C.B. I wish to acknowledge my gratitude for many courtesies to Surgeon-General G. Welch, C.B., R.N., Deputy Surgeon-General W. J. Colborne, R.N., and the staff of the R.N. Hospital, Haslar; also to Fleet-Surgeon E. T. Meagher, R.N., of Great Yarmouth, and to Staff-Surgeon R. J. E. Hanson, R.N.V.R. To Sister E. E. Saddington and to the sick berth staff of my wards and in the laboratory, more especially to Sick Berth Steward H. Smith, R.N., I shall always be grateful for their loyalty and enthusiasm and for their efficient nursing of my patients. To the patients themselves I owe much for their intelligent coöperation. Lastly, and most important of all, I offer my very sincere thanks to every one of a very large number of my colleagues. From each of them I have received at all times every possible kindness.

(Continued at foot of next page.)

Hunterian Lecture

ON

WOLFF'S LAW OF BONE-TRANSFORMATION.

Delivered before the Royal College of Surgeons of England on Jan. 23rd, 1918,

BY

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MR. PRESIDENT AND GENTLEMEN,—To-day we are to examine the principles and practice of a German orthopædic surgeon, Julius Wolff, of Berlin, who, in 1892, when he was 56 years of age and had been 31 years in practice, published a great atlas-monograph to which he gave the title: "The Law of Bone-Transformation."[1] He succeeded in riveting the attention of thinking men on a mysterious property of living bone—namely, that its external form and its internal structure change with every alteration of function; in brief, a bone has the power of adapting itself to the burden it has to bear. The expression which Wolff gave to the law was new, but the substance of it takes us back to 1834, when Charles Bell was writing his "Illustrations of Paley's Natural Theology."

"A bone may be taken to prove," writes Bell, "that in Nature's work strength is given with the least possible expense of materials. ..... Nature, solicitous for our safety in a manner we could not anticipate, combines with the powerful muscular frame a dense and perfect texture of bone. ..... The inert and mechanical provisions of the bone always bear relation to the living muscular power of the limb."

It will be seen that the idea which underlies Wolff's law was abroad in men's minds before his time, but he was the first to give that idea a definite expression. He was the first to devote 30 years of constant work and observation to prove that the shape and structure of growing bones and adult bones depend on the stresses and strains to which they are subjected. By altering the lines of stress the shape of a bone can be changed. Wolff regarded this new doctrine as one of hope for orthopædic surgeons.

ACCOUNT OF WOLFF'S INVESTIGATIONS.

A rapid survey of the first decade of Wolff's professional life will place us in possession of the circumstances which led him up to his discoveries—if discoveries they can be called. He was born in West Prussia in 1836, and studied medicine in Berlin, where he graduated in 1860 at the age of 24. Amongst his teachers was Langenbeck, who served as a link between the young pupil and the surgical practices which, as we have seen in a former lecture, were initiated at Hanover by Stromeyer in 1831. In 1860, too, the problem of bone reproduction was much discussed; Ollier had just published his earlier researches. Langenbeck advised Wolff to make "experimental reproduction" of bone the subject of a graduation thesis. In the course of studies and experiments connected with the preparation of this thesis Wolff became acquainted with discoveries which have been already cited in these lectures—the discoveries of Duhamel, Hunter, and Flourens. He started away in 1860 from the point at which Flourens left off in 1842. Having finished his thesis, he settled down to practice in Berlin.

We can measure the progress of his knowledge from certain papers he published early in 1868—preliminary studies on the growth of bone.[2] We find from these that he had broken away from the simple teaching of Flourens, who held that the shaft of a bone grew in thickness by deposition of new bone under the periosteum accompanied by a simultaneous absorption from the walls of the medullary cavity. The periosteum, Wolff found, had but a weak osteogenetic power even in young animals, and, when growing animals were fed on madder newly formed bone was frequently to be found on the wall of the medullary cavity. He reverted to Duhamel's conception that the shaft of the bone actually expanded; that by some mysterious process new bricks could be forced between the old and the new building thus enlarged. He bored holes in the shafts of growing bone at measured distances and found, as growth proceeded, that these holes moved apart. We have seen that one of Hunter's specimens showed such a separation. He concluded that the old conception of interstitial growth in bone was true. He was constantly on the outlook for every trace he could discover of the interstitial absorption and deposition of bone, particularly in the spongy extremities of long bones, and found confirmation of his opinion. In fully grown animals, however, he believed that structural elements of a bone could, under certain circumstances, remain unchanged; so long as a bone performed exactly the same function its structural elements underwent no change.

Views of Other Workers.

Wolff believed that he was the first to recognise that the tissue of growing bone was in a state of constant flux; for him bone was a plastic tissue in which demolition and rebuilding were taking place in all parts of a growing bone. In making such a claim he was scarcely just either to Hunter or to Flourens. We have seen that Hunter's conception of bone-growth was largely based on a study of the growth of the upper extremity of the femur, particularly of the head and neck. Hunter discovered that the elaborate architecture of the neck was being continually remodelled from infancy to adult life; without such remodelling the femoral shaft could not grow. The following passage shows how changeable a substance he conceived bone to be:—

"Bones begin at a point and shoot out at their surface and the part that seems already formed is not in reality so, for it is forming every day by having new matter thrown into it, till the whole substance is complete; even then it is constantly changing its matter."[3]

The following passage will show that Flourens held a similar conception of living bone.

"Mais si, d'une part, des molécules nouvelles sont incessamment déposées, si, d'autre part, des molécules anciennes sont incessamment résorbés; il y a donc mutation continuelle de la matière. La mutation continuelle de la matière est le résultat général et le résultat le plus important de toutes les expériences de cet ouvrage."[4]

Wolff's realisation that living bone was a plastic tissue was not new, but we shall see that he applied this knowledge in a way and with an insistence no one had ever done before.

The Architecture of the Femoral Neck.

A study of the neck of the femur, which proved so fruitful to Hunter, gave Wolff the key to his law of transformation. It is strange that the elaborate architecture of the neck of the human femur failed to attract the attention of early anatomists. Almost the first description we have of its architecture—the very first attempt to probe its mechanism—is that given by a contemporary of John Hilton, Mr. F. O. Ward, who demonstrated anatomy at King's College, London. The concise treatise on "Human Osteology," which was first published in 1838, and found to be a very dull book by many of those who came of a later generation, is packed with first-hand observation. Many of us will remember the drawing of a triangular

[1] Das Gesetz der Transformation der Knochen. Berlin, 1892.

[2] Berlin. Med. Wochensch., 1868, vol. v., pp. 62, 76, 110.

[3] Collected Works, vol. ii., p. 18.

[4] Recherches sur le Developpement des Os, 1842, p. 98.

(*Continued from preceding page.*)

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bracket supporting a street lamp, which was inserted by Mr. Ward to explain the architecture of the femoral neck. The bracket, which supported the lamp from an upright, was made of two pieces—an oblique supporting- and a cross tie-piece. The architecture of the femoral neck showed two corresponding sets of lines or trabeculæ—an ascending set springing from the lower wall of the neck to the head and a horizontal or cross set occupying the upper part of the neck. Ward supposed that when a man stood up these two sets of trabeculæ transferred the weight of the trunk to the shafts of the thigh bones; the ascending lines were then subjected to pressure, the horizontal lines to tension.

In 1867, when Wolff was busy with his investigations and such practice as then came his way, the architecture of the femur was being subjected to a thorough analysis by two professors in Zürich—von Meyer, the anatomist, and Culmann, engineer and mathematician. Culmann had an intimate acquaintance, both practical and theoretical, with the problems which engineers have to solve in designing iron bridges and cranes. On examining von Meyer's preparation and drawings of the femoral neck, he was convinced that, in a mathematical and engineering sense, the architecture of the femoral neck was a perfect mathematical design for the transference of weight. The trabeculæ had been given the exact position and form which the expert mathematician and engineer would postulate for them. Culmann saw in the architecture of the upper extremity of the femur the counterpart of the design which Fairbairn had embodied in his crane. Modern examination[3] of the structure of the femoral neck shows how exact Culmann's comparison was. Here, then, we have a very remarkable discovery: the osteoblasts are the architects of the femoral neck; they are engineers who do their work according to "exact mathematical laws."

Postulation of Law of Bone-Transformation.

Having absorbed the Zürich discovery we see that Wolff began to extend his knowledge in several directions. He commenced to formulate his law of bone transformation in 1870, but kept adding item upon item to it until 1885, when he satisfied himself it was complete. The first postulate which he embodied in his law was founded on a study of sections of deformed bones: he observed that when a bone became deformed its internal structure was radically changed. The internal changes, he concluded, were due to an alteration of static functions, an alteration which must take place in every deformed bone; a deformed bone ultimately became perfectly adapted to its new function or position, "according to mathematical law." He further observed that these primary alterations in the internal structure of a bone were followed by certain secondary adaptative changes in the external form, "according to mathematical law." Then in 1884–85 were added the two final and more important clauses of his law—namely, if a *normal* bone is used in a new way its structure and form will change to meet its new function; if a deformed bone is rectified and its normal function thus restored, then that bone will assume and retain its normal shape and structure. In its final form Wolff's law of bone-transformation came to read thus—I give the usually adopted translation:—

"Every change in the form and the function of a bone or of their function alone, is followed by certain definite changes in their internal architecture, and equally definite secondary alterations in their external conformation, in accordance with mathematical laws."

In framing the definition of his law of bone-transformation Wolff buried in words a simple and vital truth. The late Dr. John B. Murphy, of Chicago, found a much simpler expression when he said: "The amount of growth in a bone depends upon the need for it."

Knock-knee.

To make quite certain we shall not miss the more important truths which Wolff embodied in his law we shall apply it to a concrete instance—knock-knee or genu valgum. We want to know the cause of genu valgum, so that we may know how to prevent the occurrence of the deformity. Wolff held that, in the majority of cases, the deformity was due to keeping the lower limb in a faulty posture; he cites as an instance the apprentice baker standing over the dough-trough with legs apart. Wolff regarded the living bone as a sensitive plastic tissue, controlled by the lines of force transmitted by the framework of the limb; as long as the lines of force passed in the normal axis of the limb the bones retained their normal form and architecture. But if the lines of pressure are deflected, as in the straddled limbs of the apprentice baker, then the living bones will begin to alter the disposition of their particles, rearranging them to meet the new lines of transmission. It is rearrangement of the living particles of the bone which produces knock-knee. It was Wolff's belief that, save in those few cases where there is softening of the bones or actual disease of the limbs, no one would become the subject of knock-knee if he or she stood aright. Knock-knee was, in his opinion, the result of a faulty posture.

There can be no doubt of the extensive structural changes which take place in the bones of the lower extremity in cases of knock-knee of long standing. Wolff has given the most complete proof of that and also of the fact that the alterations are just such as will meet the altered lines of pressure. There are few, however, who will agree that the cause of knock-knee is so simple, as Wolff here supposes. In most cases we fail to find a history of faulty posture, but we do discover in the majority of such cases that there have been prolonged periods of standing or of standing and walking. We are driven, as I have pointed out in a previous lecture, to look for the primary cause, not in the bones, but in the muscles, particularly in those which are tonically and constantly in action so long as we are standing. It is when such muscles give way that the bony changes which have been depicted by Wolff set in. Wolff rejected with scorn any attempt to lay the primary blame of deformities on muscles. And yet the evidence all points to the muscles being the primary defaulters. In all static deformities I believe that the transformation of bone is a direct result of defective or unbalanced muscular action.

The principles which guided Wolff in the treatment of deformities were based on his law—on the response which living bone makes when submitted to pressures. In the case of knock-knee his first step in treatment was to restore the normal lines of pressure to the tibia. That can be done only by bringing the tibia back into its proper alignment with the femur, either by performing Macewen's osteotomy of the femur or, as Wolff preferred, by exerting pressure through the application of splints and bandages. These were forms of treatment in use long before orthopædic surgeons had heard of the law of bone-transformation; the law did not lead to any change in method of treatment. Wolff, however, was the first to bring home to surgeons and anatomists the extensive nature of the changes which have to take place in the internal architecture of the femur, tibia, and fibula after rectification for knock-knee, or any deformity, has been effected. The internal structure, which had been changed to suit the transmission of force in an abnormal direction, has to be remodelled to meet the demands of a normal transmission.

THE OSTEOBLASTS.

We are now to take our leave of Wolff. He had an uphill struggle in Berlin; recognition came late to him. In 1890, when he was 54 years of age, he was appointed professor of orthopædic surgery in the University of Berlin. He died in February, 1902, at the age of 66. Every student who has read Wolff's monograph with care must have noted that at no time was he concerned with the actual bone-builders—with the osteoblasts themselves. He has given us excellent plates illustrating the marvellous manner in which the internal structure of deformed bones has been remodelled to meet new lines of pressure; but nowhere does he mention the cunning engineers. His monograph, and the same may truly be said of his law, is a stage set out with all the necessary fittings for a play, but the actors are never called on to appear. We are now to turn to these actors—the osteoblasts—and see if we can obtain a closer knowledge of the remarkable engineering powers with which they are apparently endowed.

Spicule-forming Scleroblasts in Sponges.

In a former lecture we have mentioned Goodsir's investigation of a sponge from Spitzbergen and the discovery of the cells or scleroblasts which formed its skeleton of spicules. We shall see when we come to deal with these spicule-builders that we have before us ancient, ancestral relatives of osteoblasts, so ancient that we have to go back to the deeper strata of the earth to find their first appearance in the animal

[3] See Professor Francis Dixon's paper, Journ. of Anat. and Physiol., 1910, vol. xliv., p. 223.

phylum. Goodsir's investigations were made in 1852; at the end of the century the late lamented Professor Minchin, when he held the chair of Zoology at University College, London, again took up the study of scleroblasts. The investigations, however, which I am to bring before you are those made by a pupil of his, Dr. W. Woodland.* In 1904 Dr. Woodland began the study of spicule building in one of our commoner sponges (*Sycon coronata*) which grows in shallow tidal waters or is planted on rocks and exposed to the action of falling waves. It is important for us to note that this sponge, studded with calcareous spicules, is of a cylindrical shape tapering to its attached base and also to its free or oscular extremity. There is a central or gastral cavity surrounded by the sponge wall. The sponge wall being made up of soft tissue—an outer layer of dermal cells and an inner of lining or gastral cells—requires support and protection which are supplied by a skeleton of separate calcareous spicules. The soft walls of this sponge are constantly exposed to the force of moving waters and we shall see that the spicule-builders—the scleroblasts—are endowed with the same properties as osteoblasts—the powers of fashioning and depositing the elements of the skeleton so that the sponge can best resist the forces to which it is habitually exposed.

We shall first follow the manufacture of the simpler form of spicule—the needle-shaped or monaxon type. Dr. Woodland found that the scleroblast which was to give rise to such a spicule moved inwards from the covering or dermal layer of cells and took up a position in the sponge wall. The scleroblast then divides and at the beginning of the process a calcareous spicule commences to form—to be secreted—within the cell substance. Presently, as the spicule grows in length the daughter scleroblasts separate, each moving towards opposite ends of the spicule. The scleroblasts are now applied to only one side of the spicule, which has kept growing in length until its outer end projects into the dermal layer. Then the outer scleroblast forsakes the spicule and moves within the sponge wall, and shortly afterwards, accompanied by its companion, disappears. The needle-shaped spicules thus formed may project and are often shed from the wall of the sponge and are evidently intended for protection as much as for support.

Besides these simple needle-shaped spicules the same sponge is also provided with others of a more complex type—triradiate and quadriradiate, which are deftly planted in the sponge wall so as to give it a maximum strength. Dr. Woodland found that these more complex spicules were formed by groups of scleroblasts which arranged themselves—as Goodsir had observed—at points of a geometrical scheme. Their combined efforts produced the same perfectly fashioned piece of masonry every time. Dr. Woodland observed that if the position of a sponge was altered, the side exposed to the force of waves being reversed, the scleroblasts reacted in such a way as to strengthen the side on which the chief stresses then fell. Here, then, is Wolff's law regulating the activities of the skeleton-builders of sponges. We must suppose that such cells are sensitive to certain forces—the pressures and tensions caused by moving waters and also to the force of gravity.

Lately Professor Dendy, of King's College, London, working in partnership with his mathematical colleague, Professor Nicholson, has discovered a curious fact relating to the behaviour of spicule-forming scleroblasts. The sponge investigated by Professor Dendy is provided with long fusiform spicules. The scleroblasts, having completed the growth of a spicule as regards length, become attached at certain intermediate points of the spicular shaft, where they deposit an encircling whorl. Professor Nicholson has shown that the points at which the scleroblasts attach themselves to form whorls correspond to the internodes, the non-vibrating points, of such spicules. Apparently, as Professor Dendy has supposed, the scleroblasts are so sensitive to vibration that they are able to discover the points of least vibration on any given spicule.

In the various sponges which we have selected here as examples, the scleroblasts work their spicules into the sponge wall, much in the same manner as a corset-maker inserts supports of steel or whalebone into stays. In other sponges, however, they work in the manner of osteoblast; the product of one group of builders is united with that of a neighbouring group, so that a framework or skeleton is laid down "according to mathematical laws" and designed to meet the stresses to which their building is exposed. There is no more beautiful engineering feat than that to be seen in the Zeppelin-like framework of the Japanese sponge *Euplectella*. No one who has watched the behaviour of scleroblasts and marked the design in their workmanship can doubt that they have acquired certain characteristic qualities, chief of which is a sensitiveness to vibrations—to stresses. We see them build the same form of spicules as their ancestors, and therefore must suppose that their building quality is a gift of inheritance. We see them alter their mode of building as stresses change; we must therefore suppose that their inherited powers can be changed by the circumstances under which they work.

The Vital Properties of the Osteoblasts.

The importance of these observations on spicule-building on our interpretation of the behaviour of osteoblasts—on our interpretation of Wolff's law—must be apparent to every orthopædic surgeon. Osteoblasts seem to conduct the work of bone-building as if they had been given the training of expert and unerring engineers. As a child grows up they keep rebuilding the articular extremities of bones; the architecture of the neck of the femur is being constantly remodelled, but the osteoblasts maintain the same complex design all through. When an angular union results from fracture they re-arrange the substance of the mended bone in accordance with the new line of pressure, removing the parts which are no longer subjected to direct stress and laying down new supports in the lines where pressure is active. If a bone becomes soft and bends they meet the new condition by rebuilding along the concavity of its curvature. When we speak of Wolff's law we really mean the law of osteoblasts; it would be a great and direct gain to practical surgeons if they would discard the clumsy expression given to this law by its author. The law is simply this: osteoblasts at all times build and unbuild, according to the stresses to which they are subjected.

It is not an acquaintance with Wolff's law which an orthopædic surgeon should cultivate, but a close observance of the behaviour of osteoblasts. If he understands them fully and treats them rightly, they can prove his most helpful friends; if he ignores them, they can and do prove obstinate. In the first place, as we have seen from their behaviour in grafts, they must be subjected to stresses; stress is as necessary for their health and activity as exercise is for the living body. The mode in which they build and the lines along which they will deposit their building material are determined by the forces which are brought to bear on them. They can, by manipulating such force, be made to build as we will. We see further that they can be stimulated to overwork in many ways. H. O. Thomas, by beating the external condyle of the femur with a mallet, made the bone cells build up a rampart which prevented the outward dislocation of the patella. Injury to a bone excites every osteoblast in that bone; diaphyseal growth discs act as buffers in limiting the radiation of a stimulus. Acute inflammation increases their activity and destroys their sensitiveness to pressures.

The study of diseased conditions brings out other qualities of osteoblasts. In giants they become stimulated to an extraordinary degree by a certain substance or substances derived from the pituitary body; in certain forms of dwarfs we see this elixir of growth withheld. In acromegaly we see growth again re-awakened under a pituitary derivative—a growth which chiefly affects cartilage-covered areas of bone, areas which are constantly subjected to pressure and movement. In Paget's disease we see quite another disturbance in the life of osteoblasts. They are no longer acutely sensitive to the stresses which fall on the skeleton; they lose their engineering qualities and lay down their materials clumsily. The study of many other conditions, such as achondroplasia, periosteal dystrophy, rickets, mollities ossium, fragilitas ossium, throws sidelights on the complex nature of osteoblasts.

Wolff did orthopædic surgery a real service by insisting on the plasticity of bone, but his law is a clumsy expression of but one of the vital properties of osteoblasts. Further, we see that Hunter was not very wide of the truth when he attributed a form of "consciousness" to living bone.

* Studies in Spicule Formation, 1906, Quart. Journ. Mic. Sc., 1906, vol. lxix., pp. 251, 533.

A CASE OF RAT-BITE FEVER.

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IN spite of rat-bite fever having been recognised for some years as a clinical entity, and many of the more recent cases having been investigated by bacteriological methods, no agreement has been reached as to its causal agent.

Many observers have noted a marked leucocytosis of the polymorphonuclear type during the attacks of fever which points rather to a bacterial than to a protozoal cause of the disease. Usually examinations of the blood, lymphatic glands, &c., have not revealed the presence of either bacteria, protozoa, or other micro-organisms. In a few isolated cases occurring in different parts of the world various very dissimilar micro-organisms have been reported to have been found and to be the cause of the symptoms; for instance—

Ogata described the presence of sporozoa in the blood and lymph from the enlarged glands, but no other observer has been able to confirm this result.

Schottmüller obtained from one case a streptothrix by blood culture which was non-pathogenic for animals; and in a condition clinically resembling rat-bite fever, following the bite of a South African squirrel, the same author found a similar organism which was pathogenic for monkeys. Blake, in a case which was complicated by malignant endocarditis, found a similar organism by blood culture and, post mortem, in the vegetations on the valves of the heart. This organism was non-pathogenic for animals, even very large doses only producing a local swelling which sometimes contained a little caseous material.

Ofenheim described a case in which *Micrococcus tetragenus* was isolated from lymph obtained by puncturing the skin areas affected by the rash and also by blood culture, and from the facts that injections of a vaccine made from this organism had a very beneficial effect, and when large doses were given a distinct reaction was produced, considered this coccus the cause of the disease.

Futaki, Takaki, Taniguchi, and Osumi, in a very short note, state that in several cases spirochætes were present in the blood and fluid from the enlarged glands, and that these were demonstrated by Burri's Indian-ink method, by dark-ground illumination, and by staining sections of the enlarged glands by the silver method. They also state that the administration of salvarsan was apparently curative. Further, that inoculations of the blood and lymph from the glands into animals was followed by the presence of spirochætes in the blood of the inoculated animals.

In the case described below a streptococcus was isolated from the enlarged axillary glands; this streptococcus was agglutinated by the patient's serum, and he recovered rapidly when treated with a vaccine prepared from it.

Details of Case.

A farmer, aged 36, and previously in robust health, had his right hand bitten by a rat, about four months before his admission into St. Mary's Hospital. No particular notice was taken of the small wound thus produced, which rapidly healed without any signs of inflammation.

Between five and eight weeks afterwards a tender red swelling appeared on the anterior surface of the right forearm, which subsided without treatment. At about the same time the patient commenced to feel ill and consulted a medical man, complaining of pain in the right side of his chest, and, intermittently, of a feeling of "severe stiffness" extending from the right shoulder to the top of the forehead. A cough developed about this time and persisted for several weeks.

In the middle of December, 1916—i.e., about 3½ months after he had been bitter by the rat, he was admitted to the Maitland Sanatorium, Peppard Common, under the care of Dr. E. Carling, as a suspected case of early phthisis. Here he was found to be suffering from intermittent paroxysmal attacks of fever, but none of the physical signs of tuberculosis could be made out. He was therefore transferred to the wards of the Inoculation Department, St. Mary's Hospital, in order that his case might be more thoroughly investigated.

On admission his general condition was found to be fairly good. Physical examination failed to reveal any abnormality in the heart, lungs, or nervous system; no enlargement of the spleen could be detected, the urine was free from albumin and sugar. Enlarged lymphatic glands were, however, found in both axillæ, more especially on the right side. These glands were soft, freely movable, and varied considerably in size from time to time, the enlargement being most noticeable during and immediately after a febrile attack. The glands in both groins were also enlarged, but no enlargement of the cervical glands could be made out.

The febrile attacks occurred at intervals of three or four days when the patient was confined to bed, but even in the intervals an attack could almost certainly be induced by the patient taking a certain amount of muscular exercise.

The attack usually commenced with subjective feelings, so that the patient was usually able to foretell an attack the day previous to the actual rise of temperature. The commencement of the fever was rather sudden, but rigors were absent. As is seen in the temperature chart, the degree of fever varied considerably, during some attacks reaching 104° F., but more often being between 101° and 102°. The fall of the temperature was usually more gradual than the onset.

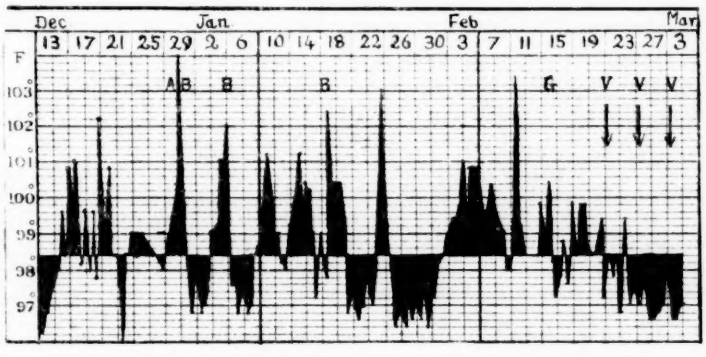

Chart showing the course of the temperature in a case of rat-bite fever. A, admitted to St. Mary's Hospital; B, blood culture negative; G, glands removed; V, streptococcus vaccine administered, 5, 8, and 10 millions. (On Dec. 26th and 27th no temperature observations were taken, and the chart is for this brief interval incomplete.)

During the attack the patient complained of a feeling of lassitude and some disturbance of the digestive system, such as nausea or flatulence. Pain in the limbs was usual, and on one occasion a dusky, bluish-red, macular rash spread over the right shoulder and pectoral region. The pulse and respiratory rates were slightly increased. No signs of inflammation of the scar of the rat-bite or of the lymphatics leading from it were ever detected. The lymphatic glands of both axillæ and groins, as has already been mentioned, became more markedly enlarged during and immediately following these attacks.

Bacteriological and Other Pathological Investigations.

Blood films were examined, both stained and unstained, on several occasions during the febrile attacks and also in the intervals between them. Examination of such films stained with Leishman's stain showed a considerable leucocytosis of the polymorphonuclear type during the febrile attack, but neither intra-corpuscular parasites nor spirochætes were ever found. The unstained specimens were examined by dark-ground illumination in order to demonstrate the presence of spirochætes, but the results were uniformly negative.

Blood cultures were made at the height of three separate febrile attacks. In each case 10 c.cm. of blood were distributed partly into tubes of simple broth and partly into tubes of broth containing trypsin. Half of these tubes were then incubated aerobically and half of them anaerobically. To ascertain the presence of growth these cultures were

examined both by the preparation of films and also by sub-culture, but with the exception of one tube, which had evidently been accidentally contaminated, all the tubes remained sterile, although they were incubated for at least ten days.

The urine also was examined bacteriologically, with a negative result. The fæces were plated out on to neutral-red-lactose-bile salt medium, but no abnormal bacteria were detected.

All these investigations being without any positive result, it was decided to remove an enlarged lymphatic gland from the right axilla. The right axilla was chosen, firstly, because the glands were rather more distinctly enlarged on that side than on the left; secondly, the right hand was the site of the rat-bite, and one of the earliest signs of the patient's illness had been an inflammatory condition of the right forearm.

On opening the axilla it was discovered that the glandular enlargement was considerably more marked than had been suspected from palpation, the axilla being occupied by a mass of enlarged soft lymphatic glands bound together by periadenitis and varying in size from a pea to a large nut. Two or three of these glands having been dissected out of the mass the wound was closed by suture. The glands thus obtained were soft, white in colour, and on section showed neither areas of congestion nor of caseation. Portions of these glands were fixed, and Dr. B. H. Spilsbury reported that sections cut from this material showed cellular changes indicating a chronic inflammatory condition. The most noticeable feature was the proliferation of the endothelium, which was so marked that in the medullary portion of the gland the ordinary lymphoid tissue was in places almost entirely replaced by masses of endothelial cells; in the secondary follicles small foci composed of four or five endothelial cells were seen scattered amongst the lymphoid cells. There was also a marked increase in the number of the polymorphonuclear leucocytes. No bacteria or protozoa could be demonstrated.

Bacteriological Investigations of Glands.

From the remainder of the glands the following bacteriological investigations were made:—(1) Cultures were made on various media; (2) two mice were inoculated with a considerable quantity of a thick emulsion of the gland tissue in broth.

1. The results of the various cultures are given in the accompanying table, from which it will be seen that

Solid Media.

Media employed.	(1) Incubated under aerobic conditions.	(2) Incubated under anaerobic conditions.
Dorset's egg	No growth.	No growth.
Blood agar	,,	,,
Serum agar plate ...	One colony of diphtheroid bacillus.	—
Coagulated serum ...	One colony of staphylococcus.	—
Agar stab	No surface growth.	One colony of streptococcus in depth of stab.
Liquid Media.		
Ordinary broth ...	Staphylococcus.	—
Broth + trypsin ...	No growth.	—
Hydrocele fluid ...	Diphtheroid bacilli.	Streptococcus.
Broth + asbestos ...	—	Streptococcus.

of the five cultures incubated under anaerobic conditions two remained sterile, while the other three showed a growth of streptococcus; in the case of the cultures incubated under aerobic conditions two gave a growth of staphylococcus and two a growth of a diphtheroid bacillus, both of which micro-organisms were most probably contaminations, since both types are constantly found on the skin of the axilla.

2. The details and results following the inoculation of the gland tissue into mice were as follows:—

Mouse 1 was inoculated intraperitoneally with about 1·5 c.cm. of an emulsion of the gland tissue in broth. Four days after the inoculation and again two or three weeks later the blood was examined for the presence of spirochætes—with negative results. This animal survived.

Mouse 2 was inoculated subcutaneously with about 2 c.cm. of the same emulsion of gland tissue. On the fourth day after the inoculation the animal was obviously very ill and on the fifth day it died. Examinations of the blood for spirochætes, on the day preceding and also after death, were quite negative.

Post-mortem examination showed that the site of inoculation and neighbouring lymphatic glands were congested. Heart, lungs, liver, and kidneys, appeared normal. Extensive plastic peritonitis was, however, present, the whole abdominal contents being matted together by soft adhesions, the meshes of which were filled with turbid fluid. The spleen was much enlarged and congested.

Films made from the peritoneal fluid showed vast numbers of streptococci, whilst those made from the heart's blood showed a few short chains and diplococci.

Cultures made from the heart's blood, peritoneal fluid, and spleen, all gave pure cultures of a streptococcus.

A *third mouse* was inoculated subcutaneously with 0·1 c.cm. of the heart's blood of mouse No. 2. This produced no obvious symptoms for a long period, but death occurred somewhat suddenly 21 days after the inoculation.

Post-mortem examination again showed plastic peritonitis, and cultures taken from the heart's blood, peritoneal fluid, and spleen gave pure cultures of a streptococcus. Films made from the peritoneal fluid showed enormous numbers of streptococci.

Characteristics of Streptococci Isolated.

The streptococci isolated from the different anaerobic cultures and those isolated from the mice which succumbed to inoculation proved to have the following characters:—

Morphology.—Long chains of round cocci with a few ordinary involution forms. Gram's stain was retained.

Cultures.—On *agar slopes*, when first isolated, growth could only be obtained under anaerobic conditions, but after subculturing good growths were obtained under aerobic conditions; the colonies were small, round, showing but little tendency to coalesce. *Broth cultures* give a thick granular deposit, leaving the upper portions of the media clear.

Action on various sugar media, &c.—Acid was produced in broths containing lactose, saccharose, and salicin, while those containing raffinose and mannite were unaffected.

These characters taken together indicated the streptococci isolated to be a strain of the *Streptococcus pyogenes*, and this conclusion was further confirmed by the fact that emulsions of this coccus were agglutinated to its full titre by a serum prepared by inoculating a rabbit with a typical *Streptococcus pyogenes* isolated from a suppurating wound.

Agglutination tests were also made to ascertain if the patient's blood had the property of agglutinating this streptococcus.

It may here be noted that emulsion of *Streptococcus pyogenes* suitable for carrying out agglutination tests may be obtained by using a medium composed of one part serum, which has been heated to 60° C., and one part broth made by digesting meat with trypsin. In such media an abundant growth is obtained after about 18 hours' incubation, which consists of such short chains of cocci that to a large extent they remain suspended in the fluid. To obtain the emulsion such a culture is centrifuged, the clear supernatant fluid removed, and then sufficient salt solution is added to the sediment to make an emulsion of the requisite opacity.

Using an emulsion prepared in this manner it was found that the patient's serum agglutinated it completely when diluted 1 in 80, and partially in a dilution of 1 in 160; a control normal serum gave no agglutination in a 1 in 10 dilution.

Progress and Treatment of the Case.

At the time the glands were removed the patient had been in St. Mary's Hospital seven weeks, and during this time there had been no indication that his condition was in any way improving, the attacks of fever on the contrary being rather more severe and the accompanying symptoms rather more marked.

Considering that streptococci had been conclusively proved to be present in the axillary glands both by culture and by the inoculation of the gland tissue into mice, and also that the patient's serum had a marked power of agglutinating emulsions of this micro-organism, this streptococcus was regarded as the probable cause of the febrile attacks. A vaccine was therefore prepared from cultures of the streptococcus, and small doses were administered. This procedure was completely successful, the doses given being 5 million cocci on 23/2/17, 8 millions on 27/2/17, and 10 millions on 3/3/17. None of these doses was followed by any reaction; on the contrary, during the ten days the patient remained in hospital after the inoculations were commenced the temperature was only once above normal (99·4° F.) and usually remained subnormal; the patient also stated that he felt much better, the pains in the limbs disappeared, and he was able to take a considerable amount of exercise without exciting any febrile attack.

In the meantime the wound made in removing the axillary glands had healed by first intention. The patient was therefore allowed to leave hospital, and arrangements were made with Dr. H. Rose, of Aylesbury, to continue the inoculations of the vaccine, a dose of 10 million streptococci being recommended to be given once a week during the first month, and afterwards at longer intervals.

The subsequent history of the case was uneventful, the febrile attacks never recurred, and when the patient was seen four months later he appeared in perfect health and had been carrying on his work for the last three months.

Summary and Conclusions.

1. The case described showed the typical signs and symptoms of rat-bite fever—namely, intermittent paroxysmal attacks of fever; an inflammatory condition near the site of the original bite, occurring some time after its infliction and

subsiding without suppuration; vague pains in the muscles and limbs; a dusky red, macular rash; enlarged lymph glands.

2. None of the various micro-organisms which have been described as the causal agent of this disease, such as sporozoa, spirochætes, streptothrix, or tetragenus, could be found, but the condition was regarded to be due to a streptococcus for the following reasons: (*a*) A streptococcus was isolated from glands removed from the right axilla—the right hand being the site of the primary injury—both by culture and by inoculation of the gland tissue into mice. (*b*) The patient's serum agglutinated emulsions of this streptococcus in dilutions of 1 in 160, whereas normal serum gave no agglutination in 1 in 10 dilution. (*c*) The administration of a vaccine made from this streptococcus was associated with immediate cessation of the febrile attacks and other symptoms.

3. This streptococcus, which was only present in very small numbers in the axillary glands, was shown by its cultural reactions and by agglutination tests to belong to the *Streptococcus pyogenes* group. When first isolated it would only grow anaerobically and its virulence for mice was not very high.

4. General considerations point to the condition known as "rat-bite fever" to be due to bacteria, and it is probable that the future will show that streptococcus is amongst the commonest of these.

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THE PRESERVATION OF TYPHOID AND PARATYPHOID BACILLI IN STOOLS BY EMULSIFYING IN GLYCERINE.

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Teague and Clurman[1] have shown that by emulsifying infected stools in 30 per cent. glycerine the typhoid bacillus can be kept living, and can be isolated, for some length of time after it has died out from a control specimen emulsified in saline. Two factors appear to contribute to this result: 1. That the typhoid bacillus is maintained alive by this process. 2. That instead of an increase in the number of the lactose-fermenting bacilli, such as occurs in the control specimen, there is an actual, as well as a relative, decrease in these organisms. The first of these factors is perhaps a corollary of the second. In the experiments here recorded this contention has been examined, and the result bears out, to a large extent, the assertion of these workers. The investigations are extended in this research to include the paratyphoid as well as the typhoid bacilli.

Account of Method.

Eighteen carrier cases were selected, but from only 12 of these were the pathogenic bacteria isolated—i.e., 2 cases of typhoid, 1 of paratyphoid A, and 9 of paratyphoid B; these being the cases ready to hand in hospital at the time. Unfortunately the dysentery group of organisms had to be omitted, since no cases of this class satisfactory for the purpose were available.

Following much on the lines of the hospital routine the tests were carried out as follows.

A small amount of fæcal material from each case, about 5 g., was provided in each of two 20 c.cm. glass pots. To one of these from each case was added 10 c.cm. of 30 per cent. glycerine diluted in 0·6 saline, to the other was added 10 c.cm. of the saline only. The fæces were emulsified by stirring up in the fluids. Daily platings from the specimens were made by taking up a measured quantity of the supernatant fluid and spreading evenly on a well-dried McConkey plate. One plate only was used for each specimen, and the results were observed after 24 hours' incubation. The specimens were kept standing out on the bench at ordinary laboratory winter temperature, approximately 16° C., during the course of the experiment.

[1] Teague and Clurman: Journal of Infectious Diseases, vol. xviii., No. 6, June, 1916, pp. 653–671.

Since the glycerinated and saline emulsions were made of about the same density and measured quantities of the same amount were taken from each for plating, it follows that a fairly accurate numerical comparison of the colonies on the two plates of any pair should be possible, and also that the pair of plates from each case should be comparable from day to day. This would not have been possible if emulsions had been made up freshly from the stock bottles day by day and merely standardised by eye.

The calculation of the number of colonies on the plates was carried out as follows.

No accurate count was made, but a plate comfortably filled with colonies was counted as five +'s or 5 for short, with diminishing numbers in proportion down to 1, which represented anything up to about one dozen colonies. The same method of calculation was used for both red and white colonies, each being estimated independently of the presence of the other. In addition to the pathogenic non-lactose fermenting bacteria there was on many of the plates a small number of the large, somewhat opaque, white colonies familiar in this class of work. These organisms, as a rule, were non-motile. They gave acid and gas with glucose and mannite and sometimes with saccharose. In most of the emulsions they outlived both the pathogenic bacteria and the coliform bacilli also. These colonies gave no trouble in diagnosis and were overlooked in the calculation. Unfortunately, there were besides these in several cases a considerable number of non-lactose fermenting colonies which were indistinguishable, except by agglutination tests, from the true pathogenic organisms. These occurred principally in the paratyphoid cases, and they had to be included in the estimation of the number of non-lactose fermenters. This accounts for the fact that in Chart 1, on the fifth day 25 non-lactose fermenting colonies are shown in the saline emulsions, although few of these were positive to agglutination tests. In all cases the pathogenic bacteria were identified by picking off into broth and subsequent agglutination with the appropriate serum.

Results of Investigation.

The following were the factors inquired for.

1. The rise or fall in the number of lactose fermenters in the glycerine, as compared with the saline emulsions, taking the actual numbers as calculated of the whole of the cases together.

2. The same factor in respect of the non-lactose fermenters.

3. The actual and relative rate of disappearance of the pathogenic non-lactose fermenters in the two classes of emulsions. These factors are illustrated in the following graphic records. Charts 1 and 2 both refer to the same cases, 18 in all, but as only 12 of these cases were positive as regards pathogenic organisms only these 12 are represented in Chart 2. The other 6 were included in Chart 1 because they contribute to the total numbers of fermenters and non-fermenters of lactose shown on the chart. Both charts refer to precisely the same experiment; the difference is that Chart 2 deals only with the pathogenic bacteria. A comparison of the two charts thus shows that, in the saline emulsions, the pathogenic, or perhaps it would be safer to say the agglutinating pathogenic, bacteria disappear before similar bacteria which do not agglutinate.

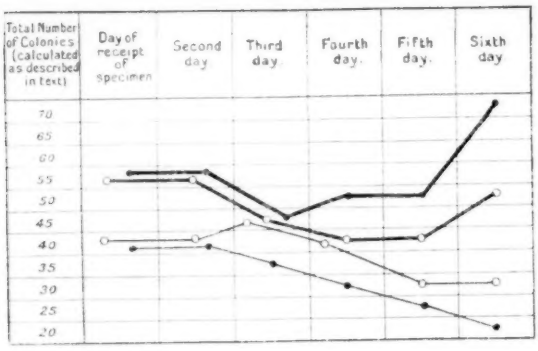
Charts and Experiments.

Chart 1 shows that the coliform organisms are kept in check whilst the non-lactose fermenters are, to a large extent, preserved in the glycerine emulsion. On the other hand, in the saline emulsions the reverse is the case, the non-lactose fermenters dying out, and the coliform bacilli rapidly increasing in numbers, especially on the fifth and sixth days. It is shown below that at summer temperatures this increase of the coliform bacilli at the expense of the pathogenic organisms is considerably more rapid in the saline emulsions than at winter temperatures.

Chart 2 shows the rapid disappearance of the pathogenic bacteria from the non-glycerinated emulsions, and the preservation of these bacteria in the glycerinated emulsions. Of the two cases that fell out on the second day one was a typhoid and one a para. B; in both of these the actual number of pathogenic organisms was, in the first instance, very small.

The experiments having been carried out at winter temperatures, it remained to confirm them with respect to summer temperatures; and two more experiments were done to this end.

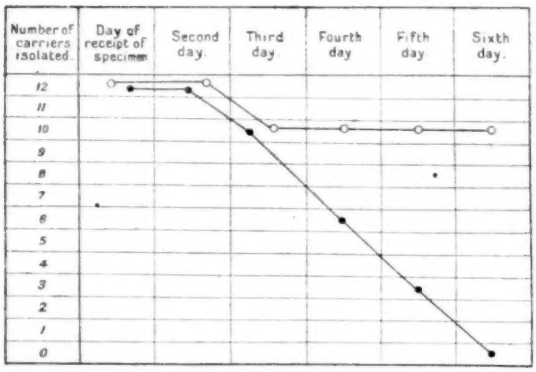
CHART 1.



Showing total daily number (as calculated) of both red and white colonies from glycerine and saline fæcal emulsions in 18 cases.

Lactose fermenters.
Non-lactose fermenters.
Glycerine emulsions (with circle).
Saline emulsions (with dot).

CHART 2.



Showing number of carriers from whom the pathogenic organisms were isolated each day, from both glycerine and saline emulsions.

Experiment 1.—Showing that glycerine emulsions of fæces kept at 26° C. for four days show practically no difference from similar ones that have been kept at 16° C. for the same period. Three carrier stools were taken, a typhoid, a para. A, and a para. B, and two 30 per cent. glycerine emulsions were made from each. One set of these was put into the incubator at 26° C., the other was left on the bench at about 16° C. Daily plating showed in four days practically no alteration in the number of the white colonies grown from either the warm or cold emulsions. By the fourth day the red colonies were slightly increased in the incubated emulsions.

Experiment 2.—A comparison of a saline and a glycerinated emulsion of a carrier stool, both kept at 26° C. for four days. A saline and a glycerine emulsion were both made from the one fæcal specimen of a very pronounced fæcal para-typhoid B carrier (showing about equal numbers of coli and para. B colonies on the plate), and both were put into the incubator at 26° C. Daily plating showed in the glycerine emulsion a slight fall in the number of the coliform organisms and a uniform preservation of the numbers of non-lactose fermenting bacilli. In the saline emulsion, on the other hand, the lactose fermenters increased enormously, while the non-lactose fermenters (para. B) showed a rapid fall in numbers, and at the end of the experiment on the fourth day they had entirely disappeared.

Conclusions.

These experiments, then, support the work of Teague and Clurman, and show that if fæcal specimens destined to be examined for the enteric organisms have to submit to delay, in transport or for any other reason, it would be well if they were first emulsified in 30 per cent. glycerine; a positive result is then much more likely to be obtained. This is especially true in warm weather and in hot countries.

OBSERVATIONS ON THE ACTION OF ACRIFLAVINE AND PROFLAVINE.

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(Report to the Medical Research Committee.)

WHEN Dr. C. H. Browning and his colleagues published their first article in favour of the use of acriflavine I ventured, while recognising the possibilities of the antiseptic, to criticise their experiments purely from a laboratory point of view. These authors have since published an account of further experiments on acriflavine and proflavine, but it seems to me that they are open to the same criticisms as their earlier ones. Still more recently Mr. A. Fleming has published an article[1] which seems to me to do serious injustice both to Dr. Browning and to flavine.

Through the kindness of the Medical Research Committee, which has supplied me with specimens of acriflavine and proflavine, I have been able to conduct experiments along the lines of those which I published in the Proceedings of the Royal Society of Medicine, 1916. As they seem to show that Dr. Browning is too sanguine and Mr. Fleming too severe, and, further, as they show that the flavines have a very powerful effect on the streptococcus—the most important of the organisms infecting wounds—I propose to give the following very brief account of them, and also to indicate the conclusions I have come to.

Observations on the Action of Acriflavine and Proflavine.

Before proceeding to describe the experiments, I would again point out that for the purpose of testing antiseptics with respect to their direct bactericidal action in wounds my experimental work leads me to look upon inoculated fresh defibrinated blood from which most of the serum has been removed and which has been incubated a short time to permit phagocytosis to take place, as analogous to pus and to infected tissue. Therefore, the first of my experiments shows what would be the effect of the antiseptic on pus or infected tissue if the ideal condition of thorough admixture with the pus or satisfactory diffusion into the tissues was actually obtained.

1. The effect of the antiseptic in killing or inhibiting the growth of organisms in tissue or pus.

Experiment.—Two parts of infected blood (phagocytic count about 10 per cell) were mixed with one part of antiseptic and incubated for 24 hours. Films were afterwards prepared and loopfuls planted on agar.

Streptococci in—	Film.	Cultures. 24 hours.	Cultures. 3 days.
1/240,000 acriflavine ...	Growth. ...	Growth. ...	Growth.
1/120,000 ,, ...	No growth. ...	No growth. ...	No growth.
1/120,000 proflavine ...	Growth. ...	Growth. ...	Growth.
1/60,000 ,, ...	No growth. ...	No growth. ...	,,
1/30,000 ,, ...	,, ...	,, ...	A few colonies.
1/15,000 ,, ...	,, ...	,, ...	No growth.

Experiments with pus containing streptococci gave similar results.

Staphylococci in—	Film.	Cultures. 24 hours.	Cultures. 3 days
1/160,000 acriflavine ...	Growth. .	Growth. ...	Growth.
1/30,000 ,, ...	? ..	Discrete colonies. ...	,,
1/15,000 ,, ...	No growth. ...	No growth. ...	A few colonies.
1/7,500 ,, ...	,, ...	,, ...	No growth.
1/15,000 proflavine ...	Growth. ...	Growth. ...	Growth.
1/7,500 ,, ...	No growth. ...	No growth. ...	Discrete colonies.
1/3,000 ,, ...	,, ...	,, ...	,,
A coliform organism in—			
1/900 acriflavine	Growth. ...	Growth. ...	Growth.
1/900 proflavine	,, ...	,, ...	,,

2. The relative bactericidal effect on staphylococci in serum and broth.

Experiment.—One part of the antiseptic was mixed with 9 parts of serum or broth containing staphylococci in numbers sufficient to show two or three organisms per field

[1] THE LANCET, 1917, ii., 341.

of a film. The mixture was incubated for 24 hours and then a film prepared and a culture made on agar.

Film of acriflavine	1 90,000	in serum	showed	good growth.
,, ,,	1 30,000	,,	,,	no obvious growth.
,, proflavine	1 30,000	,,	,,	good growth.
,, ,,	1 10,000	,,	,,	no obvious growth.

The cultures on agar showed that all the staphylococci were not killed by 1 10,000 acriflavine or proflavine, although the colonies, which were fewer in numbers in the stronger dilutions, did not appear for two or three days, except in the cases where the films showed obvious growth. This effect of retarding the appearance of the growth was very noticeable in all the bactericidal experiments, and is clearly to the credit of the antiseptic. I find, therefore, with Dr. Browning, that acriflavine acts better in serum than in broth, but not in such extremely dilute solutions.

3. The effect of a large volume of antiseptic on a small volume of infected pus.

Experiment.—One part of infected defibrinated blood was mixed with 9 parts of antiseptic. After 15 minutes 20 c.mm. of the mixture were added to liquid agar, which was then shaken and sloped.

Streptococci in acriflavine	1 15,000,	no growth.
,, proflavine	1 4000,	growth equal to that in the control.
,, ,,	1 1000,	considerable reduction in the number of colonies, but not complete sterilisation.

The effect of 1 1000 acriflavine and proflavine on the staphylococcus and a coliform organism was hardly appreciable, but 1 500 killed considerable numbers, especially of the staphylococci.

In a similar experiment with a particular sample of pus acted on by acriflavine 1 100 for 16 hours, 20 c.mm. of the mixture added to agar gave a growth of a coliform organism equal to that given by the control.

4. Regarding the toxic effect of the antiseptic.

In opsonic preparations containing 1 1500 acriflavine, I found evidence of phagocytosis after 15 minutes' incubation, but I also found marked agglutination in the mixture which made it impossible to prepare satisfactory films. It seems possible, therefore, that the phagocytosis was more apparent than real, and that the organisms merely adhered to the phagocytes and were not ingested.

In order further to test the toxicity on cells, I employed Fleming's emigration tubes, using four parts of blood and one of antiseptic in saline. From time to time I examined the specimens on a warm stage. I noticed the character of the clot was dependent on the amount of antiseptic present, the meshes being coarser and the fibrin filaments thicker in the stronger dilutions. Amœboid movements of the leucocytes were quite apparent for an hour in 1/1500 acriflavine. Within three hours, however, all movement in the 1/1500 specimens had ceased. In a second experiment there was after five hours no movement to be detected in the 1/16,000 specimens and only very sluggish movements of a few leucocytes in the 1/32,000, while the activity in the 1/64,000 was considerably reduced. After 16 hours, on careful searching, very slight movement of one or two leucocytes was still detected, but most of the leucocytes had taken on the appearance typical of the action on them of acriflavine—i.e., they became spherical, staining faintly yellow, the nuclei becoming very well defined. On the other hand, the controls were very active at the end of 16 hours and still showed amœboid movements at the end of three days. Some of the specimens which were mounted showed less evidence of emigration, especially those in the stronger antiseptic, than direct observation in the earlier stages led one to expect, but careful watching showed that the leucocytes in these fell more freely out of the clot into the serum.

The specimens containing 1/1000, 1/2000, and 1/4000 acriflavine could not be removed from the emigration tube owing to the contents coagulating, a fact which seems inconsistent with the absence of injurious effect on the tissues. Proflavine has distinctly less effect than acriflavine. For example, some movement was detected in the 1/2000 dilution after five hours. On more than one occasion it was very noticeable that in the proflavine specimens there was a very free growth of bacilli after a few hours. This was in striking contrast to the case of the controls and the acriflavine specimens.

5. Compatibility of acriflavine with other antiseptics.

It is rapidly precipitated by Dakin's solution, also by mercuric chloride.

Conclusions.

1. Acriflavine is, as regards both its antiseptic and toxic properties, more potent than proflavine.

2. Acriflavine has a very marked bactericidal inhibiting action on streptococci and a less marked on staphylococci, but on some other organisms its effect is practically insignificant.

3. Its action is therefore strikingly selective.

4. It has a marked but slow toxic action on the tissue.

5. This toxic action of acriflavine is not so great that it should not make when used in dilute solution (say 1/4000) an efficient application in a dressing for a wound infected with streptococcus or staphylococcus.

6. It should be applied after the wound has been thoroughly cleansed by washing, first with a rapidly acting antiseptic lotion, such as Dakin's solution, and then by a normal saline.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

A CASE OF DIPHTHERIA PRESENTING UNUSUAL MULTIPLE PARALYSES, WITH RECOVERY.

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THE following notes relate to a patient recently under my care. The paralytic sequelæ were unusual.

A girl, aged 9½ years, was admitted on May 27th, 1917. Her illness began on the 24th with sore-throat and vomiting, and she was said to have been "delirious." Previous infectious diseases were measles and chicken-pox. A throat swab taken before admission had proved positive for *B. diphtheriæ*. Temperature on admission 99·8° F., pulse-rate 150, respiratory rate 36. Antidiphtheritic serum (B. W. and Co.), 12,000 units, injected subcutaneously.

The patient was fairly well nourished, but pale and toxic in appearance. Tongue thickly furred, breath characteristically malodorous. Throat much injected, fauces œdematous. Tonsils completely covered with false membrane, as were also the uvula and most of the soft palate. Altogether the right throat showed the greater involvement. There was an accompanying bilateral anterior cervical adenitis, more marked on the right side. Heart sounds accelerated, soft and somewhat indeterminate in character. Pulse rapid, soft, and compressible. Lungs—there were evidences of general pulmonary catarrh. Kidneys—haze of albumin in urine.

May 28th: Throat little different; pallor extreme. 12,000 units additional serum subcutaneously. 29th: Throat condition practically unchanged. 10,000 units additional serum orally. An alkaline diuretic, diaphoretic mixture was administered. 30th: As the throat was not yet clear of membrane 10,000 units serum given orally.

June 2nd: Exhaustion marked and outlook ominous. Heart labouring considerably; its action irregular, beats poor in quality. Whisky and strychnine exhibited. 5th: Patient had developed palatal paralysis. Nasal speech pronounced, soft palate immobile, palatal reflex lost. Slight difficulty in deglutition, but no regurgitation of fluids by nose. 13th: Right internal strabismus present, causing double vision. 15th: Urine—albumin free. There was paralysis of the right levator palpebræ superioris, producing ptosis. 26th: Right internal strabismus gone. 27th: Right ptosis gone. 29th: There was loss of power of accommodation. Letterpress blurred and she could not see clearly. Pupils equal but slightly dilated.

July 2nd: It was observed that she had deviation of the tongue to the right on protrusion. 7th: There was distinct right facial paralysis. Right face expressionless and immobile. Lips pendant on the same side. She was unable to whistle or puff out her cheeks. 9th: Palate still immobile. 15th: Speech returning to normal. Palate less immobile. 16th: Sight normal. 20th: Speech normal. Palate freely mobile, reflex active. 26th: Face normal. 28th: Allowed up. 29th: The tongue was protruded in the middle line.

August 18th: Dismissed well on sixty-seventh day of illness and sixty-fourth day of residence.

It will be seen that the subject of the above notes presented six distinct and different diphtheritic palsies, representing a toxic neuritis of the several nerves involved. In order of occurrence the muscles affected were: palatal, right external rectus, right levator palpebræ superioris, both ciliaries, right lingual, right facial.

The palatal palsy was bilateral. It appeared on the thirteenth day of illness and lasted for 45 days. In consideration of the early serious and complete faucial involvement this abnormally lengthy persistence was doubtless largely contributed to by local myositis. Its presence for so long was certainly an index of the severity of the original lesion. The condition represents a toxic neuritis of the glosso-pharyngeal nerve.

The right internal strabismus was noticed on the twenty-first day of illness and was absent 13 days thereafter. Neither the date of appearance nor disappearance is particularly unusual, as the diphtheritic toxin shows a ready enough proclivity for causing abducent neuritis comparatively early, but the affection seldom persists for any length of time.

The palsy of the right levator palpebræ superioris appeared on the twenty-third day and continued for 12 days. Oculomotor neuritis producing ptosis is decidedly rare complicating diphtheria.

The loss of power of accommodation was comparatively late in its onset—namely, the fifty-fourth day of illness. This loss may manifest itself as early as the third week, although more usually during the seventh or eighth. The disability remained with her for 17 days, a somewhat short period for third nerve neuritis causing cycloplegia.

The tongue affection observed on the fortieth day of illness provides, perhaps, the most unusual feature of this case. According to most writers, actual involvement of the tongue *per se* is either discredited or considered extremely rare. If this condition is observed in conjunction with facial palsy its interpretation may be simple, for, "owing to the fact that the lips are drawn to the sound side, the tongue, when protruded, looks as if it were pushed to the paralysed side, but, on taking its position from the incisor teeth, it will be found to be in the middle line."[1] Such an explanation does not appear sufficient in this instance, as the tongue affection was noticed five days before the appearance of any facial involvement, and persisted three days after the facial musculature had returned to normal. If this tongue manifestation be conceded independently of the more or less concomitant facial palsy it would represent a concurrent neuritis of the right hypoglossal nerve.

The facial paralysis was present on the forty-fifth day and persisted for 19 days. This type is rare and does not ordinarily appear until the later weeks of convalescence.

Noteworthy features, then, were the multiplicity and comparative rarity of the palsies exhibited, together with the consistently right-sided character of the phenomena observed. This latter feature was in conformity with expectations, based on the grosser initial lesion of the right throat. Although post-diphtheritic palatal and ocular (external rectus and ciliary) affections are not uncommon, coincident involvement of upper eyelid and face muscles is very rare, whilst an independent tongue lesion is most unusual.

A CASE OF PUERPERAL SEPTICÆMIA SUCCESSFULLY TREATED WITH INTRAVENOUS INJECTIONS OF COLLOSOL ARGENTUM.

BY T. H. SANDERSON-WELLS, M.D. LOND., M.R.C.S. ENG., L.R.C.P. LOND.

IN the treatment of sepsis the problem to be dealt with is how most efficiently to weaken or destroy the infective organisms with the least damage or reduction of vitality to the patient's tissues. The intravenous injections of salvarsan and its many substitutes in syphilis have suggested possibilities in other diseases, of which the present case is, I think, an illustration. Until a number of cases have been published, and an opinion formed from them, it is difficult to know quite how far to go. Several times lately I have treated desperate cases of septicæmia with intravenous injections of eusol. In each case there has been marked improvement, but in each case the injections were left until all other treatments had proved unavailing and were too late, and I determined, should occasion arise again, to start earlier. The result in this case having been markedly beneficial would seem to make it worth publication.

Mrs. A, aged 20, was admitted to the Princess Christian Hospital on August 8th, 1917, with the following history. She was delivered of a live child by forceps one week previously; child weighed at birth 8¾ lb. The delivery was quite easy, forceps being applied to the head low down for delay in the second stage. There was a moderate-sized perineal tear, which was repaired. The perineum became septic and the stitches were removed. When admitted to hospital her temperature was 104° F., pulse 128, respiration 30. She was seen by the house surgeon, Dr. H. Maxwell Quackenbos. She had had two rigors. There was a thin sanious discharge from the vagina, a small ulcer over the perineum, and slight abdominal tenderness. She was given a purgative and the bowel washed out. Placed in the Fowler position for seven hours daily and given hot vaginal douches of lysol; also a mixture containing hexamine, acid sodium phosphate and bromide, and a dose of polyvalent serum, which was continued every day until a vaccine had been made. The next morning her temperature was normal, but in the evening it rose to 105°, and she had a rigor.

On the following day, the 10th, she was given an anæsthetic. The perineum and vagina were well swabbed out with iodine, the uterus curetted with a flushing curette, and packed with gauze soaked in collosol argentum. Her pulse before the operation was 148, her respiration 32. After the operation her temperature and pulse fell a little, but the temperature continued to rise each night to between 104° and 105° and she had rigors at intervals. Blood taken from the median cephalic vein grew a pure culture of the streptococcus, from which a vaccine was made. The vaccine was commenced on August 15th.

It was obvious at this time that the patient was losing ground, so she was given 20 c.cm. of collosol argentum into a vein. This was followed by a profound rigor and a certain amount of collapse, but the next day her general condition was much improved, the temperature had fallen to normal, and the pulse at 6 A.M. was counted at 80. The temperature rose, however, again at night, but continued at a lower range. The dose of collosol argentum, 20 c.cm., was repeated four times at intervals of a couple of days, and was followed on each occasion by a profound rigor, but, although the patient was ill, the picture had changed and she was obviously improving and in no immediate danger. She began, however, to relapse, developed a thrombosis in the external saphenous in the middle of the right calf, and her pulse returned to between 120 and 130.

On Sept. 7th the condition again became serious and a blood culture gave a growth of pure streptococcus. A further 20 c.cm. of collosol argentum were given, followed, as before, by a severe rigor; the temperature fell, and the next day remained at the normal. The general condition and appearance instantly improved, and in a couple of days she appeared to be out of danger. The temperature has since remained normal, and she has put on flesh, regained a healthy appearance, and left the hospital in excellent condition.

There has been a trace of albumin in the urine at times, but the injections of silver have up to the present caused no irritation of the kidneys and no pigmentation of the skin.

A septicæmia in which pure streptococci circulate in the blood and grow without forming local foci is undoubtedly a dangerous condition. Serum, even in very large doses, has not in my experience proved altogether satisfactory. Vaccines have seemed better in their action, but the result still uncertain. In the cases in which I have used intravenous injections the patient has always been better the next day. The general improvement in condition has been every time noted to be apparent, both to the patient and friends. On two, if not three, occasions on which the picture was almost desperate before the injection the day following the patient was caught reading the paper.

Whether or no this case would have recovered on other lines of treatment it is impossible to say, but three deductions may be made. 1. That the direct introduction of antiseptics into the blood stream in cases of septicæmia seems always to be beneficial. 2. That 20 c.cm. of collosol argentum every 48 hours produced no untoward effects. 3. That the injections should be commenced before the patient's strength is exhausted.

Weymouth.

[1] Osler: The Principles and Practice of Medicine, p. 1020.

LITERARY INTELLIGENCE.—Messrs. Cassell and Co., Limited, announce for early publication new and enlarged editions of Treves and Keith's "Surgical Applied Anatomy" and of Candy's "Manual of Physics"; the former has been revised by Professor Keith, assisted by Dr. W. Colin Mackenzie; and the "Manual of Physics" by the author.

Medical Societies.

MEDICAL SOCIETY OF LONDON.

Interlobar Empyema and other Surgical Complications of the Thorax.—Eyestrain.

A MEETING of this society was held on Feb. 4th, Dr. JAMES STOWERS being in the chair.

Major WALTER BROADBENT, R.A.M.C. (T.), read a paper on Interlobar Empyema and other Surgical Complications of the Thorax. Empyemata between the lobes, he said, were not very uncommon, but were often undiagnosed, and notes were read of illustrative cases. The characteristic of interlobar empyemata appeared to be a very dull band either in the second and third spaces in front or just below the spine of the scapula behind. Resonance was much diminished over the lower half of the lung, and breath sounds were weak. The best place to insert a needle was usually in the second and third spaces in the axilla with the arm raised above the head. Clear pleural fluid might also be interlobar. He also described a case of empyema confined between the mediastinum and the lung, the lung being previously adherent to the chest wall. A radiograph showing a round abscess cavity in the right lung was exhibited, the patient recovering under inhalations of creasote and iodine. A case was quoted of abscess of the liver bursting through the diaphragm and causing a large abscess in the front of the lung and prolonged blood-stained expectoration. This was mistaken for malignant disease, as the heart was not displaced to the left, and needles at the back of the lung, which was quite dull and silent, had failed to find pus. He mentioned a case under his care where physical signs led him to suspect empyema. A needle in the back failed to find pus, but in the anterior axillary line he drew off a pint of chocolate-coloured pus typical of liver abscess. Finally, he described two cases of subphrenic abscess, one under the left lobe of the diaphragm and the other under the right, both due to perforated duodenal ulcers. These he had diagnosed by the tympanitic areas replacing liver dullness. By the use of coins bell notes could be heard in the first case from the left anterior axillary line to the right nipple line, and in the second from three inches to the left of the sternum right over to the back of the right chest.—Dr. DE HAVILLAND HALL said that his experience differed materially from that of Major Broadbent, in that the empyemata were very small indeed, with few physical signs to help to a definite diagnosis, and in these cases the diagnosis was often not made until pus was coughed up.—Dr. MURRAY LESLIE thought the cases illustrated the advisability of giving an anæsthetic when pus was suspected from the symptoms. This was especially so in the case of children.—Mr. HUGH LETT said that X rays were most useful in the case of subdiaphragmatic abscess with slight dullness at the base and a few crepitations. He cordially agreed with Dr. Murray Leslie as to the question of anæsthetics in a case of subdiaphragmatic abscess, and drew attention to the danger of infecting the pleural cavity and getting empyema subsequently.

Dr. H. A. DES VŒUX read a paper on the Symptoms of Eyestrain as met with in general practice, which will be published later in full in THE LANCET.—Mr. ERNEST CLARKE accentuated the point that those with "perfect vision" were the most difficult to deal with. Oculists were much to blame, as they referred patients back to the physician after only a very superficial examination. Under ordinary circumstances small defects of vision were negligible and the amount of nervous energy lost was a mere fraction of the whole, but with close, concentrated work this loss of energy became important, and the symptoms it caused could be cured by glasses. He had seen epileptoid attacks brought on by the nervous exhaustion caused by eyestrain. There was no functional nerve trouble which could not be caused by it. The importance of the subject was not yet recognised.—Dr. KENNETH SCOTT said that one proof of the fact that the symptoms were due to eyestrain was that they were cured by glasses, and that when the symptoms recurred it was found on re-examination that the condition of the eyes had changed. He described the case of a lady aged 57, who had had migraine when she was 17, but had been told by an oculist that her sight was all right. She had led a most unhappy life, until at the age of 57 it was found that she had mixed astigmatism, and was made quite happy by proper correction. Patient and careful examination was most necessary, and glasses should be worn constantly. Out of 100 consecutive cases which he had seen, 81 per cent. had astigmatism or astigmatic error of low degree (below 1 D.). The position of the astigmatism was important. When against the rule the symptoms were exaggerated and severe; when in one eye the astigmatism was against the rule and in the other eye it was ordinary the symptoms were less accentuated.

The Clinical Aspects of Tuberculous Mesenteric Glands.

A meeting of the Medical Society of London was held on Feb. 11th, Sir STCLAIR THOMSON, the President, being in the chair.

Mr. H. W. CARSON read a paper on the Clinical Aspects of Tuberculous Mesenteric Glands. He considered that the resistance of the glands was lowered by septic invasion from the intestinal tract and that they were infected subsequently with tuberculosis from the same source, the tubercle bacilli reaching the intestine in milk. He analysed a series of 50 cases submitted to operation, describing three stages—i.e., simple enlargement, caseation, and calcification. The age-incidence showed 37 cases in patients below 15, and 13 above 15 years. There was a definite chronicity in the symptoms, many patients having been ill for two or three years. He gave a description of the typical case and referred particularly to pain, which he considered diagnostic. It was a true colic, and was due to tonic contraction of the circular muscular coat of the bowel. Differential diagnosis had to be made from chronic appendicitis, ureteric stone, digestive disorders, intestinal parasites, and lead poisoning. Complications were almost all of the type of intestinal obstruction. There were three cases of intussusception in the series, which Mr. Carson considered to be due directly to spasm of the affected segment of the intestine. The various types of obstruction met with were described. With regard to treatment, the necessity of correcting diseases of the nose, pharynx, and mouth was emphasised, and laparotomy advised, even in typical apparently uncomplicated cases. He advocated removal of the glands rather than curetting in the uncomplicated cases, and in cases of obstruction advised the removal of the glands and freeing of adhesions or enterectomy rather than short-circuiting or the formation of an artificial anus. The paper contained an analysis of the after-results in the 47 cases of recovery.

Dr. LEONARD GUTHRIE said that in his experience calcified tuberculous mesenteric glands were usually found only after death. They were very difficult or impossible to palpate. He thought that the symptom of colic was not sufficient for diagnosis. He asked what were the indications for operation. He was not accustomed to ask for operation for free fluid. Intussusception, of course, and obstruction, from whatever cause, must have surgical aid. In his own hospital the recoveries with medical treatment amounted to 80 per cent. and with surgical treatment to 50 per cent., the latter including surgical complications.

Mr. V. WARREN LOW thought that colic was not an evidence of uncomplicated tuberculous mesenteric glands, but was a definite evidence of obstruction of the intestine, due probably to a kink or adhesion. When he operated he usually left the glands alone and prescribed rest, small doses of tuberculin, and open air. A large proportion got well. He had always found the colic associated with a temperature which was out of proportion with the clinical symptoms. He had not regarded tuberculous mesenteric glands as a clinical entity.

Dr. WALTER CARR said that he usually regarded the chronic febrile diseases of childhood as being probably tuberculosis of some internal glands. He thought that it was impossible for tuberculosis of the glands to go on to calcification without fever. Were tuberculous mesenteric glands found in every case in which the typical symptoms occurred? Calcareous glands were often found in the abdomen post mortem. He thought they did not usually give rise to tuberculous peritonitis, this being caused by (1) blood infection, and (2) local extension of infection from the intestine. Tuberculous mesenteric glands might give rise to miliary tuberculosis. In London the bronchial glands

were more often the source of infection, whereas in Scotland the infection appeared as a rule to come from mesenteric glands.

Mr. H. J. GAUVAIN agreed that tuberculous mesenteric glands existed without tuberculosis elsewhere. Of 2000 cases of tuberculosis of the bones and joints which he had seen, none had these glands affected. He had never come across the colic described by Mr. Carson as typical of these cases. He never tried to remove the glands. The treatment he used was open air, and when the glands were getting smaller he endeavoured to assist calcification by administering calcium salts. He confirmed Mr. Carson's opinion as to the absence of temperature.

Dr. EDMUND CAUTLEY thought that the symptoms described were not evidence of tuberculous mesenteric glands. They were very usual in children, and the pain was spoken of as reflex colic, and was due to intestinal indigestion. Tuberculous glands in the abdomen were often found in perfectly healthy children. He considered that many of Mr. Carson's cases were not purely tuberculous mesenteric glands, for there were complications which showed extension to the peritoneum. Operation was not justifiable unless there was a complication indicating the necessity for it.

Mr. CARSON, in reply, said that he regarded colic as a constant symptom, and without it a diagnosis of tuberculous mesenteric glands should not be made. The children which he described differed from those mentioned by Dr. Cautley in that they were all on the down-grade, getting thinner and more ill. In his experience pain was not usually associated with the complications.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OPHTHALMOLOGY.

Changes in the Vitreous Resulting from Penetrating Septic Wounds (Couching).—Direct Observation of the Fundus Oculi during a Period of Temporary Blindness.

AN ordinary meeting of this section was held on Feb. 6th under the presidency of Mr. WILLIAM LANG.

Lieutenant-Colonel R. H. ELLIOT read a paper entitled "Changes in the Vitreous Resulting from Penetrating Septic Wounds (Couching)." The contribution was illustrated by a profusion of slides taken from a wide experience in India. The author reviewed the paper on a similar subject published by Professor Straub in 1912, based largely upon the experimental injection of the eyes of two rabbits with tubercle bacilli, resulting in infection of the ciliary body. Professor Straub contended that the septic matter set up chemotactic action in surrounding vascular structures and caused also optic neuritis. Colonel Elliot's present paper was based upon 780 cases of couching, and the anatomical examination of 54 globes.[1] The material was therefore more abundant than Straub's, and there was a greater variety in the conditions of infection, for in the practice of the operation by native Indians the instruments, hands, and surroundings were filthy; there was a great variation in the age and health of the patients, in the nature and virulence of the introduced organisms, in the period after operation at which the material was obtained, and in the methods of operation. Slides were shown of extreme instances, and he asked that they might be regarded as affording an opportunity for the elucidation of pathological problems, as a series of experimental infections of the eye with septic material. In couched eyes the appearances found in the vitreous included slight gauzy films, filmy masses in the anterior part of the chamber, a fine cone of exudate in the vitreous, an organised cone of exudate, masses of exudate scattered through the vitreous and isolated inflammatory foci therein, total detachment of retina with inflammatory matting of all parts, and the remains after panophthalmitis. He contended that the difference between the exudate massed in the anterior part of the vitreous and the cone of the vitreous was artificial; in his specimens there was a breaking of material in transit from India. Localised infection of the vitreous was not met with, except in one case in which the tip of a copper probe was left behind, and where organisation appeared to be strongest near the ciliary body and near the optic nerve head, and this was a matter of vascular supply. The backward flow of lymph to the channels round the nerve head was suggested by the cone of exudate, and he showed specimens which supported his view: there were new-formed vessels in the apex of the cone of exudate. In the author's view, Straub's contention that hyalitis was due to chemotaxis following the deposition of septic matter in the vitreous took too little account of the infection of surrounding structures. The occurrence of plastic uveitis sufficed to explain the vitreous opacities seen during life, as well as the vitreous exudate seen in the specimens. Detachment of the retina was found in 70 per cent. of the cases, and this was explicable by the pouring of exudate into the vitreous chamber, adhesion of the exudate to the retina, and a shrinking of the exudate. Was the pouring of the exudate into the vitreous chamber due to chemotaxis from an infected vitreous, or to a primary infection of the surrounding vascular coats? He inclined to the latter view. The lens lay in front of the anterior hyaloid membrane, and in two of the cases the vitreous was not invaded by the instrument, yet there was an abundant vitreous exudate. The retina contracted adhesions to the exudate by the wound and by inflammation the result of chemotaxis, by inflammatory thickening of the anterior layers of the hyaloid body, and by cicatricial bands radiating from the focus of infection.

Mr. TREACHER COLLINS said he had spent some hours studying this wonderful collection of specimens, and found that they abounded in points of clinical and pathological interest. With regard to the mode of infection of the vitreous humour, Professor Straub's main contention was that the exudate from the ciliary body was not forcibly expelled therefrom, but drawn into the vitreous, an attraction into it by chemotactic action. Straub showed that the dust-like opacities in the vitreous seen in keratitis were little groups of phagocytes, not scattered promiscuously, but definitely arranged on the outer side of the hyaloid membrane. Straub did not, however, adequately explain why chemotaxis was more potent at certain points than at others. Mr. Collins's own contention was that the central points were not dead phagocytes, but dead tissue cells which had desquamated from the surface of the ciliary body or from the iris, that these were carried forward in the lymph stream of the aqueous and its duct to the back of the cornea, and there set up chemotaxis.

Mr. HERBERT PARSONS did not consider that there was so much difference of opinion between Professor Straub and Colonel Elliot on this matter as the latter seemed to think, and much of it might be attributable to Straub's incomplete knowledge of English. The value of Straub's specimens was that they showed an early stage of the infection of the vitreous. It seemed clear that there was a localised infection of the vitreous in the early stages, but that it rapidly passed into a general infection of the vitreous. He (Mr. Parsons) could not conceive of a lens being depressed, declined, or transmitted into the lower part of the posterior chamber of the eye without injuring the vitreous very seriously. He expressed his high appreciation of Colonel Elliot's contribution.

Colonel ELLIOT briefly replied.

Major A. W. ORMOND read a note on the Direct Observation of the Fundus Oculi during a Period of Temporary Blindness. A major in the French Army, at present engaged in engineering work, came to consult him. Five days earlier, in the evening, he had suddenly lost the sight of his right eye for about eight minutes, and since then he had had seven or eight attacks of equal duration. It was not followed by headache or pain. One attack occurred while he was in a darkened room. Some of the attacks seemed to be associated with his movements, such as stretching his arms after sitting in a cramped posture. He had lived for some years in the French Gaboon, and had suffered badly from lumbago. While giving his history he had an attack, and Major Ormond examined the eye while it was in progress. The pupil of the right eye enlarged to about 7 mm. in diameter. The optic disc was blanched, also the immediately surrounding retina. Veins alone of the vessels were evident, the superior and inferior retinals being those chiefly under notice. The inferior retinal showed distinct notching on its concave side only; there were four or five notches. While being watched they suddenly disappeared. The vein resumed a normal appearance. The patient then suddenly remarked: "It is coming back." In a few seconds he could see

[1] THE LANCET, 1917, i., 325, 361.

again, and the pupil contracted to the size of the other. The optic disc looked redder and more suffused than normal. The arteries showed their position, the superior artery twisting round the superior vein, and so causing the appearance seen when first looking at the eye. It seemed to have been a localised contraction of the central retinal artery, resulting in a temporary blanching of the disc and retina in the immediate neighbourhood, with a gradual lessening of the blood in the veins, so that the endothelial lining had become ruffled into horizontal folds as the lumen emptied. Subsequent pressure of the globe with the finger resulted in almost complete emptying of the artery and considerable depression of vision. Dr. John Fawcett's examination of the patient a few days later did not reveal any signs of organic disease. His maximum systolic pressure was 130 mm., and the radial arteries were good. Heart and urine were normal. The contraction of retinal arteries seemed to be similar to that in the "amblyopia of migraine." It could scarcely be regarded as intermittent claudication. The attack was probably due to sedentary life and excessive cigarette smoking.

Somewhat similar cases were referred to by the PRESIDENT, Mr. HERBERT PARSONS, Dr. P. C. BARDSLEY, and Mr. VERNON CARGILL.

SOCIÉTÉ DE BIOLOGIE, PARIS.

THE following is a summary of papers read at the meeting of this society on Jan. 26th:—

AUGUSTE PETTIT.—On Lorient's Spirochæte.

E. MAY.—Significance of Carabelli's Tubercle.

P. MASSON.—Botryomycosis in a Gunshot Wound.

M. relate l'observation d'un blessé qui présentait une ulcération fistuleuse de la cuisse consécutive à une fracture par éclat d'obus. L'examen histologique de cette plaie révéla la présence de foyers inflammatoires développés autour de petits séquestres osseux ou de grains spéciaux analogues à ceux qui caractérisent la botryomycose du cheval, et formés comme eux par des colonies de staphylocoques entourées d'une membrane protectrice. L'auteur a pu suivre la formation de ces grains. Les staphylocoques poussent pendant un certain temps à l'abri des leucocytes dans les canaux de Havers des séquestres et y forment des masses compactes où les germes morts et vivants sont entassés. L'os venant à être corrodé, les colonies sont mises à nu et s'enveloppent d'une membrane protectrice secondaire. Cette membrane a les réactions tinctoriales des crosses de l'actinomycose et de la botryomycose expérimentale (Maygrou). Il s'agit donc d'un cas de botryomycose humaine véritable, à opposer à ceux que, depuis Poncet et Dor, on désigne indûment sous le même nom.

P. MASSON.—Superficial Elastic Fibres in Gunshot Wounds.

Dans les peaux cicatricielles, les fibres élastiques ne se régénèrent que très tardivement et très incomplètement. En particulier, le lien élastico-épithéliel manque pendant longtemps. Ce fait explique, avec d'autres déjà connus, la fragilité des épidermes reconstitués. C'est une indication de plus en faveur de la réduction maximale des cicatrices par la suture primitive ou secondaire des plaies.

P. REMLINGER.—Diffusion of the Virus of Rabies in vitro through the Brain and other Organs.

S. COSTA, J. TROISIER, and J. DAUVERGNE.—Hæmotoxic Action of the Diphtheria Bacillus and its Diagnostic Value.

L'action hémotoxique paraît une propriété spécifique du bacille diphtérique et peut être utilisée en même temps que la formule biochimique pour sa détermination.

A. NANTA.—Early Hæmatological Changes after Hæmorrhage.

EDOUARD RETIF.—Physiological Research on the Semilunar Ganglions.

Chez le chien et le lapin l'ablation du ganglion gauche ne détermine que des troubles passagers sans gravité; l'ablation des deux ganglions ou seulement du ganglion droit, entraîne la mort dans l'hypothermie. Il y a de la diarrhée et de l'amaigrissement, résultant de la deshydration de l'organisme.

R.-J. WEISSENBACH and W. MESTREZAT.—Bactericidal Properties of the Cl-ion.

W. et M. rapportent le résultat d'expériences de contrôle du pouvoir bactéricide in-vitro de solutions hypochloritées contenant même poids de chlore, mais en combinaison différente. Les solutions hypochloritées acides ou neutres à la phtaléine (solution bicarbonatée chlorée ou solution alumino chlorée) ont un pouvoir antiseptique double des solutions hypochloritées fortement alcalines (solution Dakin-Daufresne). Ils rapprochent ce pouvoir bactéricide double du pouvoir déchlorant, double de celui de la quantité de chlore contenu, que possède l'acide hypochloreux libre, propriété que l'industrie utilise.

A. CHAUFFARD, GUY LAROCHE, and A. GRIGAUT.—Cholesterin Content of the Suprarenals at Different Stages of Fœtal Life.

Reviews and Notices of Books.

Studies in Forensic Psychiatry. By BERNARD GLUECK, M.D., Instructor in Psychiatry and Neurology in George Washington and Georgetown Universities. (From the Criminal Department, Government Hospital for the Insane, Washington.) London: William Heinemann. 1917. Pp. 269. Price 10*s.* 6*d.* net.

THE volume under review is one of a series of monograph supplements to the *Journal of Criminal Law and Criminology*. It deals with criminal types from the view-point of the psycho-pathologist, and describes a considerable number of particular instances exactly after the fashion and in the language of ordinary medical case-histories. The first chapter forms a clinical study of the psychoses of prisoners, with especial reference to their psychogenesis; the second deals with the treatment of the prison psychoses; the third is devoted to cases of litigious paranoia; the fourth to the malingerer; and the last to the kleptomaniac. In each instance the author has at his disposal a wealth of clinical criminal material, well sifted and well considered, and he is thus in a position to point a criminal moral and, from its not infrequent picturesqueness, to adorn a criminal tale. There can be no doubt that the trend of investigation in criminology is setting steadily away from academic discussion of crime and punishment, of criminal law and procedure, to the intensive study of the individual delinquent, and with this movement the psycho-pathologist must become increasingly identified. Dr. Glueck has made the claim of the psycho-pathologist to approach the problems of criminology from his own side irrefutable. His book is a series of clinical studies, with commentaries, the intrinsic interest of which cannot be adequately indicated in a brief summary. We especially recommend the chapters on the malingerer and the kleptomaniac for their clinical and psychological insight. Dr. Glueck has utilised the resources of the psycho-analyst in the latter section, and while we think his interpretation of his findings is open to criticism which we can scarcely here enter on, no one can read his cited case through without being impressed by the fact that by such methods only can the investigator ever hope to unravel the motives underlying antisocial behaviour. If we mention but the one statement, quoted from Gudden, that "practically all cases of female shoplifters whom he has examined were, at the time of their offence, in or near their period of menstruation" we shall thereby give an idea of the author's line of approach.

It is pleasing to the medical mind to read Dr. Glueck's strictures on the mental attitude of the jurist, who is compelled to look upon crime not as it concerns the individual who committed the deed but as it is affected by the statutes covering it. But at the same time it should be said that these strictures are not conceived in any intransigent spirit; rather are they written in the hope that more uniformity of approaching the criminal problem may thus in the end be attained.

Religion and Realities. By HENRY MAUDSLEY, M.D. London: John Bale, Sons, and Danielsson. 1918. Pp. 100. Price 3*s.* 6*d.* net.

THIS polished little book of essays, summing up Maudsley's philosophy of life, reached us on the day of his death, which we believe the author faced for himself in the manner in which he writes on p. 18: "Withal Nature has the last word to say, and says it alike to ants and men—they must learn to go into the dark without fear."

JOURNALS.

Parasitology. Edited by G. H. F. NUTTALL, F.R.S. Assisted by EDWARD HINDLE, Ph.D. Vol. X., No. 2, Jan. 22nd, 1918. Cambridge University Press. Price 12*s.* 6*d.* net.—On the Development of *Ascaris lumbricoides* and *A. mystax* in the Mouse, by Major F. H. Stewart, I.M.S., is the second part of a paper on the life-history of these two worms in the mouse and rat. In this article the author traces the history of the migration of the larvæ from the eighth day of infection, when they reach the trachea of the

mouse, to the fifteenth day. During this latter period the worms begin to pass from the lungs and trachea down the alimentary canal, and accumulate in the cæcum and upper colon. They also commence to pass out in the fæces. These results were obtained by feeding experiments, which are described in detail, and in addition the author gives an account of the anatomy of the larvæ from the large intestine and fæces of the mouse between the tenth and fifteenth days after infection. Feeding experiments with *A. mystax* gave only negative results.—On the Life-History of *Ascaris lumbricoides* L., by Major F. H. Stewart, I.M.S., contains an account of further experiments on the development of this parasite, showing that the ripe eggs can hatch in the intestine of the pig and pursue the same course through the body as in the rat and mouse. The author is of opinion that ascariasis is at least equal to ankylostomiasis in its effects on man. With regard to pulmonary ascariasis, it seems that certain cases of pneumonia in young pigs may be the result of ascaris infection, and that in human beings it may occasionally favour the development of lung affections.—Some Results of a Survey of the Agricultural Zoology of the Aberystwyth Area, by C. L. Walton, comprises an exhaustive and interesting account of the various species of parasites occurring in North Cardiganshire and the adjacent borders of Montgomeryshire, an area of about 250 square miles. Especial attention is paid to the parasites affecting farm animals and the factors concerned in their occurrence.—Liver Rot of Sheep, and Bionomics of *Limnæa truncatula* in the Aberystwyth Area, by C. L. Walton, is a continuation of the previous article especially concerned with *Distomum hepaticum* and its spread by *Limnæa truncatula*. This snail is chiefly restricted to damp clay soils and is soon killed by desiccation. Cercariæ can be obtained from it in large numbers practically throughout the year, the snails from roadside ditches being most frequently infected.—A Contribution to the Anatomy and Embryology of *Cladorchis* (*Stichorchis*) *subtriquetrus*, Rudolphi, 1814 (Fischoeder, 1901), by F. D. Weidman, is an account of the anatomy of this fluke, which occurs in the cæcum of the beaver.—A Note on the Period during which the Eggs of *Stegomyia fasciata* (*Aëdes calopus*) from Sierra Leone Stock retain their Vitality in a Humid Temperature, by A. Bacot, comprises the records of experiments with the eggs of this mosquito, showing that they will hatch after 15 months' storage in a humid atmosphere, at a temperature of 6.6° C. to 17·8° C.—Notes on Ticks, by Cecil Warburton, is a description of two new species of *Ornithodorus* from India and Mesopotamia, respectively, and of the hitherto unknown female of *Hyalomma monstrosum*.—On the Occurrence of Hydatid Cysts in Monkeys, by William Nicoll, is the record of a cyst found in the abdominal cavity of a South African baboon, *Cynocephalus porcarius*. All the larger mammals, including man, seem to be possible hosts of this parasite, it having been recorded from more than 40 species.—*Dolichopera macalpini*, n. sp., a Trematode Parasite of Australian Poisonous Snakes, by William Nicoll, is the description of a new trematode occurring in the tiger- and copper-head snakes of Australia.—Are *Entamœba histolytica* and *Entamœba ranarum* the Same Species? An Experimental Inquiry, by Clifford Dobell, comprises the results of attempts to infect tadpoles by feeding them with human fæces containing cysts of *Entamœba histolytica*. The dysentery amœba and that occurring in the cæcum of frogs (*E. ranarum*) are morphologically indistinguishable, but these feeding experiments gave negative results. There is no support, therefore, for the hypothesis that *Entamœba histolytica* and *E. ranarum* are merely two forms of the same species inhabiting two different hosts, and consequently the frog, in all probability, is not a reservoir of human amœbic dysentery. The author concludes with a note on the specific name of the entamœba of this disease, which, contrary to general acceptance, is sometimes called *E. dysenteriæ*, and argues in support of retaining the well-known name, *Entamœba histolytica*.

Military Surgeon (December, 1917).—To this issue Major Thomas W. Salmon, Medical Officers' Reserve Corps, U.S. Army, contributes a valuable paper on Shell-Shock, which should be read by all military medical officers. Life in the Army, he says, strains men's minds, war adds to the strain, and insanity frequently occurs. The functional neuroses cause in this war about a fifth of the invalidings. They are no new diseases, and now occur so frequently that they must be thoroughly understood by the medical officers. They are caused by the strains of war, and as the most terrible strain is the endurance of high explosive shell fire, so the neuroses get the popular name of "shell shock." The term is now applied to any nervous symptoms developed by men who have been under shell fire but are unwounded, even definite mental disease is sometimes included. Major Salmon, in classifying these cases, includes sudden shock of explosion causing death and the syndrome, due to concussion and sudden decompression, under the term "shell-shock," but other conditions are included in the term not so rightly. The employment of the name "shell shock" for all sorts of groups of neurotic symptoms as seen in civil practice is undesirable, though it can be defended. There are yet other cases which occur in men not up in the line at all, "anticipatory" neuroses, quite resembling those above. That these are all in part psycho-genetic is thought to be proved because they so resemble those others seen before the war; they are distributed particularly among the officers, scarcely occur amongst the wounded or prisoners, and psychological treatment does them most good. In war, as in peace, these neuroses provide the patient with escape from an intolerable situation, people experiencing horrid sights or sounds becoming hysterically blind or deaf, and so on, and the soldier's position in war is often intolerable. His instinct of self-preservation, with its correlated emotion, fear, would constantly make him fly were it not that this simple reaction is inhibited by love of country, discipline, and the herd reaction we call comradeship. Fear is, however, reinforced by horror, yearning for home, and other emotions; hence arise within soldiers, particularly if ill-trained and unenthusiastic, many mental conflicts, for each such man the question being how to escape. Wounds and the credit they bring are the best avenue; capture by the enemy is another. There were only eight cases of shell shock amongst 60,000 prisoners taken from the terrific fighting about Verdun. The term shell shock suggests an invariably acute onset, but the condition may be of slow growth and no more attributable to the last shell than an attack of delirium tremens to the last glass of spirits. But onset may be very sudden, the patient at one moment an apparently dependable soldier, and ten minutes later nerve-shaken, unable to stand or perhaps to speak. Such attacks may be precipitated by personal private distress; the case of a steady soldier who broke down when he found his wife was a hardened prostitute is to the point here. Neuropaths go down quickly, but men apparently normal fail; yet many of them were volunteers. Neurasthenic symptoms are commoner amongst officers, gross sensory and motor symptoms of hysteria amongst the men. Treatment is not always satisfactory: "Some go into hospitals as shell-shock cases and come out as nervous wrecks," says Major Salmon with obvious accuracy. Cases of organic disease, renal calculus, for example, and tuberculosis of the spine, have been found among them. Many are suspected of malingering, but they can be distinguished, for the shell-shocked patient has an excessive interest in his symptoms, easily yields to suggestion, and his self-pity is marked. The history of onset may exclude organic disease. Hysterical stigmata, such as anæsthesia and helicoid fields of vision, may help us as much as the patient's own account of his disease, which too often is puzzling. Here is a point known to all but which too often is forgotten. The malingerer simulates a disease to deceive others and dislikes examinations; the hysterical patient deceives himself, and may be cured by being undeceived, while he positively revels in examinations; besides, he presents extra signs of his disease, of which he does not complain, being unaware of them. The treatment of shell shock is essentially psychological: the physician must study his patient and keep him under control. Persuasion and suggestion come first, and treatment is more successful the nearer the firing line the patient is, because in the circumstances of actual war all the powers and inducements of discipline remain. France has found it necessary to establish treatment centres near the lines, and America, we learn, will follow suit, patients being isolated from their friends and given useful occupation, of the sort that progress will be obtained through achievements constantly more difficult. Aimless lounging, too many exciting motor drives, are to be discouraged. These cases suffer from disorder of will as well as disorder of function, and both must be cured together. This very judicious paper will well repay perusal.

THE LANCET.

LONDON: SATURDAY, FEBRUARY 16, 1918.

The Tuberculosis Service in War-time.

THE last annual report of the medical officer to the Local Government Board contained a special report in reference to tuberculosis under war conditions. This was recently published in THE LANCET, and at the same time there were being separately issued the reports of many public authorities upon tuberculosis and of institutions for the tuberculous. The various documents give indications of the importance of the comprehensive scheme for dealing with tuberculosis laid down by the Local Government Board, but interrupted by the outbreak of international hostilities. The reports from public sanatoriums, such as those at Ventnor and Bournemouth, show that there has been as much demand by civilians for beds as ever, and that, apart from military patients, the type of case applying for admission has improved, resulting in a definite increase during the last year under review in the percentage of discharges labelled "cured or arrested." Naval and military cases, on the other hand, have largely been of an acute or advanced type on admission to the sanatorium, while most institutions have found difficulty in getting these patients to conform to sanatorium routine or to remain long enough under treatment. The importance is always insisted upon of a long stay at a sanatorium, to allow the patient not only to go through a complete course of graduated exercise and work, but also to learn some occupation which he can follow profitably on leaving the institution. The reports from public authorities charged with the carrying out of local schemes for dealing with tuberculosis in their own areas show that they recognise the importance of performing the work as far as possible in the national interest. In spite of depleted staff and finances a few authorities have even succeeded in adding new items to their armament in order to improve the efficiency of their schemes. Since the war started Somerset County Council, for instance, have erected a new hospital of 20 beds for advanced cases of tuberculosis and a sanatorium school with similar accommodation for children in the earliest stages of the disease, and have lately succeeded in effectively covering the whole of their area by the establishment of 30 voluntary care committees, with a central coördinating organisation and a paid organiser. Cornwall, with a happy combination of enterprise and good fortune, has embarked on a large scheme for securing institutional treatment on modern lines within the county by the aid of voluntary funds, and has already obtained substantial support for it. Most authorities have discovered that whatever were their pre-war needs in regard to advanced cases, accommodation is now urgent for the numerous discharged sailors and soldiers returning to their areas. Local Pensions Boards are freely utilising their new machinery for examining suspicious cases and obtaining advice on those already known to them. Such work throws an extra strain on the tuberculosis officer, and sometimes puts his powers of expert diagnosis to a severe test. The absence of many of these officers on active service is a serious loss to the nation, as the work is special and difficult. On the resumption of normal conditions a high standard of experience and special training should be demanded of all tuberculosis officers holding senior posts, their conditions of service being improved in order to attract and hold men commanding the confidence of the general practitioner.

It is abundantly clear from Sir ARTHUR NEWSHOLME'S report that war-time conditions have increased the demand for a comprehensive tuberculosis scheme, and yet executive authorities are handicapped by decreased funds and staff. The question arises, What are the items in the scheme that may be sacrificed with least damage to the whole? First to go must be those in which there is overlapping, usually on account of dual responsibility. The local medical officer of health and the tuberculosis officer should decide between themselves who is to take responsibility for the home conditions of notified cases, so that one visitor only should give time and energy to supervision, an arduous task in a scattered rural district. The solution here is the appointment of a trained and discreet tuberculosis health visitor, holding the sanitary certificate, who should visit and revisit all notified cases in her area and report in duplicate to the two executive officers. If she is qualified to fill up statutory notices in regard to housing defects, a special visit from the sanitary inspector in ordinary cases will thereby be saved. Next, and to economise the time of the tuberculosis officer, contacts should be brought to the dispensary for examination, the cost of conveyance by rail or road being refunded. Thus home visitation by the tuberculosis officer would be reduced to the rare case in which the practitioner desires radical change of treatment for a patient who is too ill to attend the dispensary. Dispensaries with any considerable attendance should not be closed down if it can be avoided, for they represent the most economical form of treatment for a large number of patients, apart from their value for diagnosis and consultation.

The results of institutional treatment have been the subject of public debate, and this question is freely discussed in the various reports which we are discussing. In most of them just stress is laid on the inability of the patient on his return home to follow out the treatment started in the institution. The causes underlying this inability may be summed up as inadequate or improper housing, inadequate food, and improper occupation. Bad housing is a colossal evil which can scarcely be touched during the war, but the other two factors may be greatly ameliorated by the efforts of local voluntary care committees. The experi-

ence of the tuberculosis officers of Lancashire, Somersetshire, Hertfordshire, and the city of York, in particular, should commend to local authorities the formation of committees similar to those inaugurated by these public-spirited communities; a large measure of war economy may be accomplished by such measures. The spirit of generosity and anxiety to help others aroused by the war only needs guidance and suggestion. Care committees have found suitable work for discharged sanatorium cases, sometimes providing allotment gardens or small workshops, at others extra food and clothing to insured and uninsured alike, and especially to children. They have boarded out delicate or suspicious but unnotified cases where there is liability to infection at home, and have set up or subsidised local open-air day schools for children in the district who are excluded from the ordinary schools. Local authorities which have appointed a paid organiser of care committees in their area, defraying the administrative expenses, have reaped a benefit in so doing. Such examples should be widely followed. The increased interest recently aroused in the whole question of tuberculosis as shown in these reports is one of the bright spots in public health polity.

Bone-Grafting and Bone-Transformation.

THE detailed history of a therapeutic measure is always full of interest, and often no little instruction can be derived from a critical study of its earlier stages, for thereby we can see why some method of treatment has failed even though it has held within it the seeds of success. With the innumerable opportunities afforded by the present war those surgeons who have been engaged in the treatment of the wounded have found themselves impelled, or even compelled, to devise and employ some method to compensate for the extensive losses of bone or for fixing securely ill-placed fractures. In the Hunterian lectures, delivered before the Royal College of Surgeons of England by Professor ARTHUR KEITH—one of which was published in last week's issue of THE LANCET, while its sequel appears this week—the introduction of the practice of bone-grafting is fully described. Professor KEITH shows that in this matter, as in many others, JOHN HUNTER was ahead of his time. Although in the exact meaning of the phrase HUNTER never grafted bone, yet he may be looked upon as the forerunner of those who practise bone-grafting at the present time. He worked on a closely allied subject, and showed that a tooth which had been removed could be successfully replaced in the jaw and would become as firmly fixed as before; further, HUNTER'S experiments in the transplantation of the spur of a fowl pointed out the possibility of bone transplantation, for the spur contains within it a solid mass of bone, an outgrowth of the tarso-metatarsus of the fowl's leg. There appears to be no recorded instance of attempts at grafting bone after the work of HUNTER until we come to the year 1858, when OLLIER, of Lyons, endeavoured to transplant periosteal grafts. Sometimes he succeeded and sometimes he failed, and though he could not then find the reason for his varying results, we now see that the causes were two. One cause, sepsis, we have been able to recognise since LISTER introduced antiseptic surgery; but the other cause is more obscure, and it is only in recent years that we have appreciated the fact that it rests on a physiological basis. Transplanted periosteum will not give rise to bone, or if some bone forms it will soon disappear unless the fillip of use provides the stimulus needed to excite the osteoblasts to carry on their activities. Unless the muscles of the part cause stresses and strains in the bones, atrophy of any bone present will occur, and of any bone-forming material; the osteoblasts present will fail to form bone, and the bone already formed will tend to disappear. This dependence of the growth and even the structure of bone on the use to which it is put, and on the muscles which act on it, is clearly brought out in Professor KEITH'S second lecture, wherein he enunciates and explains WOLFF'S law, which lays down the principle that the structure of a bone depends on its function.

The next step was taken by MACEWEN, of Glasgow, who, in 1880, transplanted portions of bone with success and the bone so formed waxed stronger under the stimulus of the action of the muscles of the part. Further progress was made by Sir W. ARBUTHNOT LANE, when employing metallic plates for the union of fractured bones, for he showed the value of internal splinting. These plates form a successful method of treatment, but the metal plate is a foreign body, and in some cases its unyielding nature does not allow it to accommodate itself to the growing bone, and it is in the bones of children that this unadaptability is most conspicuous. Experiments performed by GALLIE, of Toronto, in 1914, seemed to show that transplanted bone acts merely as a scaffolding for the formation of new bone, but an extended experience has proved that transplanted bone does not necessarily die, for a transplanted fibula has accidentally been fractured and yet it has united within the usual time. ALBEE, of New York, has systematically developed the idea of bone splints. By the aid of very ingenious instruments he has been able to cut a strip of bone with a minimum amount of damage to it, and he has been able to provide for it a resting-place which it will exactly fit without any risk of being too loose or fitting too tightly. The value of his methods has been abundantly shown by the success which they have attained. The absence of a foreign body is a very definite gain, for there seems to be little doubt that a foreign body in some way favours the activity of any septic germs which may obtain entrance to the wound, so that it is distinctly harder to prevent septic complications if metal is employed.

The reference has, so far, been to the use of bone-grafts in cases of mechanical injury, but they have also been used to replace the losses resulting from the necrosis of disease. A striking case is that described by Mr. C. J. BOND, of Leicester. Here a child

had lost the whole of the diaphysis of the tibia from acute osteomyelitis and by two operations the shaft of the adjacent fibula was placed between the surviving epiphyses of the tibia. Four years later the transplanted bone had approximated in size to the original tibia, and the child could walk and run without any noticeable limp. Cases such as these, though as yet they may be few in number, suggest a great promise for the future. The experience of MACEWEN shows that portions of bone removed from other persons may supply the deficiencies in a patient, but it seems clear that the best provider of bone-grafts is the patient himself. The present position of bone-grafting is highly promising, and the more the conditions under which bone-grafts live and grow are studied the better the results that will be obtained. A great field of research lies open, a field in which ample room will be found for that coöperation between the physiologist and the surgeon which must mark the real progress of the future.

Meat Rationing in London and the Home Counties.

THE question of the moment in regard to food control is somewhat excitedly centred in the new provisions outlined in the scheme of restricted meat allowances to come into force in London and the Home Counties on Feb. 25th next. Already a number of coupon cards has been distributed. The particulars of the scheme have been widely published in the press, and everybody is now familiar with them in detail. Generally speaking, the scheme entails cutting down very considerably the allowance of butchers' meat, and on so many days the dietary will perforce show in so many instances an abeyance of butchers' meat altogether. It is easy enough to foreshadow difficulties connected with the fair and successful administration of the proposals, which we are told may receive modification at any time, but we are unwilling to believe that the Ministry of Food has failed to realise the great responsibilities of launching such a scheme upon a large and critical community. On the whole, the public appears to be inclined to unnecessary misgivings on the subject, but we think that, provided other classes of food are available, such as fish, eggs, vegetables, and fats, it will soon be appreciated that meat is not so essential a factor of our diet as has been for long maintained. The diminished allowance of meat can obviously be compensated—it has been already to a great extent; but all turns, it seems to us, on the question of the adequate supply of meat replacers. If fair substitution is ensured no anxiety of a shortage of body reparatives need enter our minds. The progress of the tentative movement will be watched with extreme interest, but this policy need not be extended to the rest of the country as a whole, as in some localities, we understand, satisfactory schemes are already in existence.

Annotations.

"Ne quid nimis."

THE EPIDEMIOLOGY OF PLAGUE.

Bubonic plague is endemic in the British Empire and its presence in normal times is a constant menace to the public health of the community. Under war conditions, which necessarily entail increased movement of population with less efficient means of control, naturally the risk is increased. Dr. John Brownlee's contribution on Feb. 8th at the Royal Society of Medicine to the theory of plague epidemiology is therefore specially welcome. As statistician to the Medical Research Committee he dealt with the broad aspect of the whole subject, showing in the first instance that the great bulk of plague epidemics in such large towns as London, Bombay, Calcutta, and Sydney during the last three centuries have had certain common features. He continued:—

> These epidemics have been symmetrical in shape and their form essentially constant during the whole period. The same form of epidemic has occurred among rats. Two different theories may be entertained. Assuming infection to be proportional to the number of acute cases at any moment, the epidemic ends, on the first hypothesis, from lack of susceptible persons and, on the second, from loss of infecting power on the part of the organism. In Bombay the first hypothesis is numerically consistent with the data for brown rats, but not in the case of the black variety. In man the form of the epidemic shows points of difference demanding some secondary hypothesis, e.g., that disease foci when present in large numbers are more effective in spreading the disease than sparse ones; following the law which connects density of population and death-rate. In the United Provinces of India, where marked variations in weather occur from year to year, the November humidity is closely associated with the humidity of succeeding months and with the number of plague cases in the epidemic, the exact relationship being that the logarithm of the number of cases is proportional to the humidity. Periodicities independent of the solar year probably exist in Poona, Cawnpore, and other towns. Weather conditions varying from month to month do no more than modify the form of the natural epidemic.

The broad epidemiological aspect would also be of great interest in regard to the outbreak of pneumonic plague reported from China.

Early in January it was officially announced from Peking that pneumonic plague had broken out on the borders of Mongolia, and that the infection had spread into Shansi, one of the four northern provinces of China. The disease was then threatening to extend southwards and eastwards into the populous province of Chih-li, in which is situated Peking, the capital of the Chinese republic. The present outbreak resembles closely that which, early in 1911, swept over the Mongolian border into Manchuria, and in little more than three months carried off between 50,000 and 60,000 victims.[1] That epidemic, like the present one, began in the cold season, and both appear to have been aided in their development by the exceptional severity of the winter. Both outbreaks had their origin on the Mongolian border, which is a recognised endemic area of plague, and the endemicity is said to be associated with the presence of the disease in a species of marmot, called the tarbagan, found there in large numbers and hunted in the autumn months for the sake of its fur, now in great demand. In both outbreaks the infection spread rapidly along the lines of railway communication, and in neither of them was the diffusion assisted by the agency of rats or fleas,

[1] THE LANCET, 1911, i., 1152.

the disease spreading alone by personal contact—that is, by the inhalation of the droplets containing plague bacilli coughed up by those suffering from the malady. Owing to the extreme cold overcrowding and overheating of houses are promoted, doors and windows are kept closely shut, chinks and crevices are stopped up to exclude the outer air. A case of pneumonic plague, shut up with a crowd in such circumstances of overheating, lack of ventilation, and insanitation, would infect all exposed. In the Manchurian epidemic every person attacked by the disease succumbed, there being no instance of recovery on record. Should pneumonic plague become epidemic, as seems probable, in the populous province of Chih-li the consequences are likely to be serious, for countless numbers of the inhabitants are suffering from severe privations, the result of recent floods, and cannot be in a condition to offer much resistance to the onset of a grave infection. At the beginning of the outbreak the Chinese Government was strongly urged to take immediate measures for stopping the spread of the disease, and accordingly a medical commission, with Dr. Wu-Lien-Teh, Director of the North Manchurian Anti-Plague Service, as leader, was despatched to the Shansi-Mongolian border. On arrival they were, unfortunately, met with the undisguised hostility of the people, whose unreasonable attitude was largely supported by the local Government officials and by the military. It is to be hoped that the Chinese Government will support the recommendations of the Medical Commission, led by Dr. Wu, and that steps will at once be taken to bring to book the Shansi officials, and other parties concerned, who permitted the ill-treatment of the medical commissioners sent to assist the inhabitants of the province in averting an epidemic which is fraught with such wide-reaching consequences.

DETERMINATION OF THE DATE OF DEATH.

WHEN a dead body is found under circumstances which suggest a crime the difficulties of determining the time which has elapsed since death has taken place are well known. If several days have passed it may be almost impossible to determine the period with accuracy, but within 48 hours a more definite opinion may be expressed, although even then temperature of the air, the degree of moisture present, and the environment of the body may produce effects which may easily be deceptive. This was shown in Casper's well-known observation in 1848, when he examined the bodies of 14 men, aged between 24 and 30, who were shot at the barricades, all dying about the same time. Two days afterwards in no one case did the signs of putrefaction resemble those of another. If a reliable method could be employed which would enable an opinion to be formed in respect to this question, it would undoubtedly prove of great value in medico-legal cases. We have received a communication from Dr. Belmiro Valverde, of Rio de Janeiro, recording the results of some examinations he has made on the blood taken from dead bodies at varying periods after death. He states that certain crystals may be found in the blood after putrefaction has occurred which yield interesting information. These crystals are known as the "Westenhöfer-Rocha" crystals, after the observers who first described them. They generally take the form of rhomboidal prisms and are well shown in micro-photographs which accompany the article. They present characteristic physical and chemical properties which render them easily recognisable, but their exact nature is as yet unknown. Dr. Valverde states that he has only found them in the clot and not in the serum. Their importance lies in the fact that they only appear in the blood at a certain time after death and only exist for a certain period. After numerous observations he found that during winter they were most numerous on the third and fourth days after death and in the summer on the fifth and sixth. They develop gradually, passing through various stages until they reach their full shape and size. They continue in the blood for 35 days, after which they finally disappear. A study of these crystals would evidently be of advantage in medico-legal cases, but their true significance can only be determined after further research. They might prove of great value in cases where a dead body has been found so far advanced in decomposition that it would be most difficult, if not impossible, to state by the methods at present employed how long it was since death had taken place.

SACCHARIN AS A SUGAR SUBSTITUTE.

THE only interpretation of the very general use nowadays of saccharin is that a large section of the public value sugar merely for its sweetness and not for its food value or for its high calorific position. If the inherent property of sugar did not happen to be sweetness the employment of saccharin in its stead would be meaningless. This is an important point, because if a large proportion of the public seeks only a sweetener in using sugar in their beverages, then their demand can readily be satisfied by a sweetener substitute such as saccharin. In that case a considerable amount of sugar will be saved for those who use it for its real food purposes, and particularly for young growing people, to whom its energy value is of considerable importance. Sugar cannot be replaced by saccharin in the preservation of milk or in the preparation of jam, and the use of saccharin in beverages like tea and coffee will afford an important saving of sugar for such purposes. It remains to consider whether the use of saccharin for sweetening purposes is likely to disturb the health of the consumer. The evidence that saccharin did not appear to produce any harm in the organism was summed up in these columns last September, and there is still no ground for thinking that it is in any way harmful, while its sweetening power is so great that only minute quantities suffice to satisfy the palate. It should be remembered that the use of saccharin has been prohibited in those cases where, by replacing sugar, the consumer would lose the food value contributed by that substance. It is not allowed, for instance, to be used in beer or in preserved foods. Saccharin has no food value whatever.

IRISH BILLS OF MORTALITY.

IN his presidential address at the Section of State Medicine of the Academy of Medicine in Ireland Sir William J. Thompson discussed some of the characteristic features of the bills of mortality in Ireland. To obtain figures for useful comparison the 50 years up to the end of 1915 were divided into quinquennial periods. The lecturer pointed out that while the drain on the population by deaths from all causes in Ireland increased by some 2 per cent. in the period 1911–15 as compared with 1866–70, the mortality in England and Wales decreased 36 per cent., and in Scotland 29 per cent.

during the same stretch of time. The different position of Ireland in this respect was accounted for in large measure by the effect of emigration. Fully 85 per cent. of the emigrants in recent years were between the ages of 15 and 35, and the exodus of the young and healthy naturally left behind more than a due proportion of the sick and infirm to keep up the death-rate. As regards epidemic disease, the same decrease had taken place in Ireland as in England and Scotland, although in lesser degree, while the figure for tuberculosis was 13 per cent. for Ireland, as compared with 56 per cent. for the other countries. Cancer mortality showed the familiar tendency to rise, although with 86 per 100,000 of the population the figure for 1911–15 was low, as compared with 105 for England and Wales or 110 for Scotland. The Registrar-General's address gave rise to an interesting discussion.

HOMICIDE IN AMERICAN CITIES.

AN article on the mortality from homicide in cities of the United States in 1916 contributed to a New York weekly insurance paper, the *Spectator*, by Mr. F. L. Hoffman, derives its principal interest from the extraordinary prominence of a single city in the statistics relating to the crime under discussion. As to the precise meaning to be attributed to the term "homicide" in connexion with the figures given we are, unfortunately, not informed. It may be assumed that "homicide" is intended to include cases which in England and Wales would be classified either as murder or manslaughter, but we are not sure whether the figures given as relating to homicides in the article referred to are based only upon cases in which a criminal has been convicted and sentenced for the crime. If this is so, the frequency of homicides in many cities in the Southern States is rightly regarded by Mr. Hoffman as serious, and the record of the one which heads the list, Memphis, Tennessee, is truly remarkable. The sombre pre-eminence of Memphis is not merely a recent or sudden phenomenon. In the years 1906 to 1910 its rate of homicides was 74 per 100,000 of population, and in the years 1911–1915 70·6. In 1916, however, the rate rose to 89·9, the actual total being recorded as 134. If we compare other American cities in the last-named year, we find that the homicides in the two next in the list, Atlanta and New Orleans, were respectively at the rate of 31 and 25·6 per 100,000, and that at New York the rate was 4·6. The homicides which actually took place in these cities in the year were in Atlanta 59, in New Orleans 95, and in New York 256. It is to be observed that the five cities with the highest homicide record are all in the South, but the author of the article does not find any sufficient explanation of the state of affairs which would appear to prevail at Memphis either in its geographical position or in any excess of negro or foreign elements in its population. It may be mentioned, however, that a table, quoted on the authority of the Department of Public Heath for Memphis, gives a far larger proportion of homicides as prevailing among the coloured population than among their white fellow citizens, and the coloured section seem to have contributed very considerably to the unenviable pre-eminence of their town. This table, however, does not closely tally with that from which the total of 134 has been quoted above, although it still shows a number and proportion of deaths by homicide appallingly high. In these circumstances, without suggesting any explanation ourselves, we can only concur in the opinion expressed by Mr. Hoffman that the matter is one for the serious consideration of the proper authorities (and that not only at Memphis) with a view to diminishing so terrible a record of crime, and also that the greatest accuracy and care should be exercised in order that the statistics given may be beyond question. The diminution of crimes of violence in the United States by processes of education and by the spreading of humanising influences, as well as by direct enforcement of the law, particularly in Southern States, no doubt presents problems which do not occur with us, and comparison with the conditions prevailing in the United Kingdom need not be carried far. It may be mentioned, however, to take a few English examples available, that in 1913 in the whole of Lancashire, with a population of nearly 5,000,000, there were only 6 convictions for murder and 19 for manslaughter, and that the corresponding figures in Yorkshire were 6 and 16 and in London 17 and 25. In Scotland the charges of murder and manslaughter in the same year reached a total of 42. In Dublin City in 1914 the charges of murder were 3 only, these being of infants. It is rather for us, however, to take precautions against increase in our own record of crime during the present time of war, and during the period of unrest which is likely to follow it, than to criticise an allied nation in respect of conditions which differ from our own and which are no doubt receiving due consideration from its Government.

A COMMON ORIGIN FOR SHINGLES AND CHICKEN-POX.

Dr. W. P. Le Feuvre, writing in the *British Journal of Dermatology and Syphilis* (October–December, 1917), comes to the following conclusion as a result of a series of very interesting and suggestive observations: "Shingles should be definitely recognised not only as an infectious disease but also as one liable, under certain unknown conditions, to become a starting-point for a chicken-pox epidemic, and, therefore, deserving of a place in the list of notifiable diseases." What is the evidence upon which so important a conclusion is based? This writer in three years took notes of seven cases of chicken-pox in children following shingles in one of the parents. Thirteen similar cases were elicited, as a result of publication by the writer of some of his cases, from English practitioners. Seventeen more came up in the correspondence columns of the *British Medical Journal* in 1913. Two are recorded from Guernsey and, finally, 11 were reported up to 1912—50 cases in all. The points common to all were: (1) chicken-pox in one individual following shingles in another within the ordinary incubation period for the former disease—i.e., within 21 days; (2) no other source of infection besides shingles discoverable; (3) by far the majority of cases showed shingles in an adult, generally a parent, followed by chicken-pox in a child. Further, three distinct types could be recognised: (1) chicken-pox in one individual contracted from shingles in another (41 cases); (2) shingles contracted from a case of chicken-pox (5 cases); and (3) shingles and chicken-pox existing in the same individual at one and the same time (4 cases). The last group is very interesting. They are quoted in some detail and look quite convincing. The site of the herpes was variable, but in all the interval between the herpetic and varicellar eruption is fairly constant—i.e., from

two to four days. A striking case illustrative of this group is quoted from Dr. F. Parkes Weber's paper on Herpes Zoster, published in *International Clinics* (Vol. iii., Series 26), where herpes broke out in a patient whilst having arsenical treatment. "Five days later a generalised but scanty eruption of varicella-like spots occurred. A little boy, aged 4 years, was in the same ward, and 10 days after his discharge from the hospital developed varicella." Two other cases showed similar development of varicella-like spots after herpes zoster. Such is the evidence in favour of the suggested close relationship between these two diseases. It is a question, obviously, to which the general practitioner can most satisfactorily supply the answer.

FUNCTIONAL DISORDER OF THE HEART IN SOLDIERS.

AT a recent meeting of the Ulster Medical Society Dr. J. E. MacIlwaine gave his experience at an overseas base of the clinical examination of over 3000 cardiac patients, roughly two-thirds of whom he found to be suffering from functional disorder. Physical examination failed to detect the presence of organic disease, while a routine examination of the nervous system showed lack of mental control, increase of deep reflexes, and other evidences of a state of irritable weakness of the psychic and psycho-motor systems. In these cases Dr. MacIlwaine assumes a similar condition of irritable weakness in the involuntary nervous system which betrays itself by the irritable heart syndrome in response to effort or emotion. A fuller study of the involuntary nervous system, as elaborated by Gaskell, would, in Dr. MacIlwaine's opinion, illumine many of the symptoms of so-called neuroses. He summarises thus the automatic functions of this system:—

1. It acts as the bodily thermo-regulator, keeping it at constant temperature by proper blood distribution and sweat secretion in spite of varying internal and external conditions. Strain is put upon this function by effort and privation.
2. It regulates the alimentary mechanism.
3. It adjusts the blood-supply so that its distribution is only momentarily affected by gravity and sudden postural change.
4. It determines the involuntary visceral effects of emotion.
5. It controls the mechanism of the organs of reproduction.

It is in this involuntary neuro-muscular mechanism that a condition of irritable weakness is most evident in functional disorders of the heart. The two basal factors in the etiology of the condition are emotion and intoxication. Emotion the soldier is trained by discipline to control. The effect of bacterial toxæmia is well recognised in the section of post-infective neurasthenia, and the rheumatic toxins, with their selective action upon the nerve dendrites, are of special importance. Normally the cardio-vascular tone and the circulatory efficiency are maintained by a balanced nervous action in the involuntary nervous system, just as tone and coördination of movement in the voluntary muscular mechanism depend upon the proper integration of nervous impulses to opposing muscles. Sympathetic overaction expresses itself in tachycardia and sweating, vagal preponderance in faintness. In cardiac neurasthenics sympathetic overaction is in the ascendant, and often coincides with evidence of vagal insufficiency shown by an atonic state of the stomach and intestines. Dr. MacIlwaine concludes that the essence of the cardiac disorder is an increased reaction of the individual nervous system to an intoxication, the results of which would be subliminal in respect of signs and symptoms in a normal person.

THE BELGIAN DOCTORS' AND PHARMACISTS' RELIEF FUND.

A MEETING of the Executive Committee of this Fund was held on Feb. 7th at the offices of THE LANCET, Sir RICKMAN GODLEE being in the chair.

The HONORARY SECRETARY announced that among those who had responded to invitations to join the General Committee sent out on the decision of the Executive Committee at their last meeting were Sir A. Garrod Thomas, M.P., Sir Thomas Barclay, Director of Southall Bros. and Barclay, Mr. Harry J. Fisk, representing Messrs. Parke, Davis, and Co., and Lieutenant-Colonel Adami, of the Canadian Army Medical Corps. Letters from other members of the General Committee in reply to the invitation to a meeting on Jan. 31st were read and their suggestions noted.

The minutes of the meeting of the General Committee on Jan. 31st were taken as read, as they had already been published in substance in the medical and pharmaceutical press and in full in THE LANCET. At that meeting the view of the Executive Committee that the Fund must continue its work was unanimously endorsed, and as a first step it was decided to circularise the medical and pharmaceutical professions.

Dr. SPRIGGE read a draft of the proposed circular letter to the medical profession, and said that the minimum cost of issuing such an appeal individually to a constituency of some 30,000 was, he was advised, £175. He added that the proposed circular would make one document of four pages, with a banker's order for the payment of monthly subscriptions as a perforated slip.

The meeting approved the draft circular in substance.

Dr. HAWTHORNE pointed out the value of supplementing such a circular by some machinery for stimulating local effort.

Sir THOMAS BARLOW asked whether the publication of the circular letter as an appeal in the *British Medical Journal* and THE LANCET would not lessen the expense or in any way take the place of the posted circular.

Dr. COX and Dr. SPRIGGE both thought that such publicity could only be additional to a posted circular.

Dr. SPRIGGE said that members of his staff could supervise the addressing of the envelopes, and Dr. COX said that the card-index of the medical profession, kept up to date by the British Medical Association, could be placed at the service of the Committee.

Mr. MABEN said that his firm sent out 3000 to 4000 leaflets per week, and that an arrangement made with the other big commercial houses would quickly cover the two professions. He thought that the circular letter would do excellently for the pharmaceutical profession, and considered that 9000 or 10 000 copies would be required.

The Committee left the issuing of the circular letter in the hands of the treasurer and secretary.

It was agreed to send a cheque for £400 to the Commission for Relief, to be forwarded to Belgium for the month of February.

SUBSCRIPTIONS.

The following subscriptions to the Fund have been received during the week ending Feb. 11th:—

	£	s.	d.
Dr. Norman Walker ...	5	5	0
Sir Alfred Pearce Gould (£5 for advertising, £5 for relief)	10	0	0
Dr Alfred Cox	1	0	0
Dr. W. Black Jones ...	1	1	0
Mr. J. E. H. Watson ...	1	1	0
Per Sir Rickman J. Godlee	2	0	0
Dr. David Rice	3	0	0
Dr. J. T. Rogerson ...	2	2	0
Dr. Chas. J. Lathbury ...	2	2	0
Dr. T. W. Robbins	1	1	0
Mr. Charles Ryall	26	5	0
Dr. Herbert Menzies ...	2	2	0
Miss Marjorie Monkhouse	5	0	0
Dr. Cameron Kidd ...	2	2	0
Dr. Hale White	5	5	0
Mrs. Dunphie	5	0	0
Dr. Hyla Greves	3	3	0
Dr. A. Hill Joseph ...	2	2	0
Dr. H. B. Williams ...	2	2	0
Dr. Uhthoff	5	5	0
Captain F. W. Joynes, R.A.M.C.	1	1	0
Dr. Herbert Lucas... ...	1	1	0

The allocation by Sir Alfred Pearce Gould of a subscription towards advertisement of the purposes of the Fund draws timely attention to the fact that the circular appeal to the two professions of medicine and pharmacy, determined on by the Executive Committee, must be a costly proceeding.

Subscriptions to the Fund should be sent to the treasurer of the Fund, Dr. H. A. Des Vœux, at 14, Buckingham Gate, London, S.W. 1, and should be made payable to the Belgian Doctors' and Pharmacists' Relief Fund, crossed Lloyds Bank, Limited.

THE CONTROL OF VENEREAL DISEASES.

THE DIAGNOSIS OF SYPHILIS: ITS TREATMENT BY NOVARSENOBENZOL, MERCURY, AND IODIDE OF POTASSIUM.[1]

BY H. W. ABBOTT, M.R.C.S. ENG., L.R.C.P. LOND.,
MEDICAL EXAMINER TO THE ROYAL INSURANCE COMPANY.

MOST authorities believe that in all probability the incidence of syphilis will be much greater during the immediate future than it has been for many years past. The first line of resistance to this disease will, of course, be offered by the general practitioner, for it will be to him that the sufferer, in the great majority of cases, will apply for treatment. It is therefore a part of the duty of everyone engaged in general practice to become proficient in the newer, as well as in the older, methods employed for the recognition of specific disease—more especially so because at least one of these more recent methods enables a diagnosis to be made at an earlier stage of the malady than was possible previous to its introduction.

This article is therefore addressed chiefly to the general practitioner, and particularly to the doctor who, living some distance from any of the large hospitals, has not had the opportunity of attending the courses of lectures on venereal disease now so frequently given at these institutions, nor has been able to see the work done at the venereal clinics which have recently been established in various parts of the country. If it leads to an earlier diagnosis in recent cases of syphilis, if it awakens a more lively interest in the newer methods employed for the detection of this disease, its purpose will have been accomplished.

The Value of Early Diagnosis.

The necessity for an early diagnosis is very urgent, because, by placing the patient under appropriate treatment, his infectiveness is cut short—a most desirable end from the social point of view. It has likewise been found at the Military Hospital, Rochester-row, London, S.W., that only one-half as much treatment is required to clear up a primary case as is necessary for a secondary one.

By the term primary is meant an infection so recent that the blood still gives a negative reaction to the Wassermann test; while by a secondary case is meant a patient who, though suffering from comparatively recently acquired syphilis, yet has had the disease long enough for the blood serum to give a positive Wassermann reaction. Most important of all, however, is the fact that it is in these earlier cases that one has the greatest opportunity actually of sterilising the patient—of really and truly curing him. The following is an instance illustrating this:—

M. —— presented himself on Jan. 23rd last complaining of a penile sore and giving the history that the lesion had commenced ten days previously with the formation of a papule, which had gradually developed into the ulcer for which he now sought treatment. The chancre was about one-half of an inch in diameter and was fairly typical of specific disease; there was, however, no distinct rash, but the patient had characteristically enlarged inguinal glands. Two capillary tubes were charged with the serum expressed from the sore, one of which was sent to the Great Northern Hospital, Holloway-road, N., for examination, the contents of the other being examined by myself the next day. *Spirochætæ pallidæ* were isolated in both specimens and the patient was given 0·45 g. of novarsenobillon by intravenous injection in the afternoon of the day following that on which he had first presented himself. In all ten injections were given, of varying doses of novarsenobillon, the maximum amount reached being 0·9 g. The intravenous medication was combined with weekly intramuscular injections of 1 gr. of mercury. At the end of the course—that is, in April—a specimen of blood was sent to the pathologist at Charing Cross Hospital, and a report was received that the blood serum gave a negative reaction to the Wassermann test. A second specimen was sent in July, and a third in November with a similar result. No rash developed; there has been no throat lesion, no iritis, no periostitis, no alopecia, no secondary symptom of any kind other than the glands; in fact, the patient has never suffered from any obvious manifestations of syphilis beyond the initial penile sore, which healed a few days after treatment was commenced, and the enlarged glands, which soon disappeared.

I am of opinion that, owing to the early vigorous treatment he received, this patient's blood serum never did become positive to the complement reaction, and that in all probability he has really been cured. Moreover, this case is not an isolated one, but is quite typical of what can ordinarily be accomplished by making an early diagnosis and by beginning treatment without any delay. The importance of early treatment has been emphasised by Colonel F. W. Mott in the following note, which has been written with special reference to this paper:—

"After the organism has been disseminated throughout the body, including the nervous system, treatment becomes much more difficult to be successful; in fact, it is doubtful when once the spirochæte has gained access to the cerebro-spinal fluid it can ever be eradicated. Certainly the existence of the spirochæte in the central nervous system produces a positive complement reaction of the fluid, and I have not yet seen a positive fluid become negative by treatment, although a coincident lymphocytosis *may* disappear with treatment."

Methods of Diagnosis.

The means of detecting syphilis can perhaps best be enumerated under the following four heads:—

1. The physical examination of the patient.
2. The microscopical examination of the serum obtained from a penile sore or from some other lesion.
3. The examination of the patient's blood serum, for the complement-fixation reaction (the Wassermann test).
4. The examination of the cerebro-spinal fluid.

I.—*The Physical Examination of the Patient.*

The physical examination of the patient is, of course, the method which has been practised from the early ages for the detection of specific disease, and although the importance of the other three more recent means of diagnosis can scarcely be over-stated, yet the physical examination of the patient still remains a most important part of the ordinary routine method of investigating cases of suspicious venereal disease. A description in detail of the physical examination of a patient suspected to be suffering from specific disease would, however, occupy too much space to be included in the present paper; moreover, the reader can consult any good text-book on the subject.

II.—*The Microscopical Examination of the Serum Obtained from a Syphilitic Sore.*

This method of diagnosis is within the competence of any practitioner; it can be completed in a few moments; it gives a diagnosis which is quite unequivocal—absolute—final. If *Spirochætæ pallidæ* be found under the microscope in the serum obtained from a suspicious lesion in one of our patients, then that patient is suffering from syphilis. It must be borne in mind, however, that in all probability spirochætæ will not be obtainable from a syphilitic sore to which antiseptics have recently been applied. The surface spirochætæ will certainly have been killed by such procedure; so that if a patient presents himself with a penile sore, which, as is frequently the case, he has himself been treating with some form of antiseptics, it is best to send him away for 24 hours, with instructions freely to wash the sore during the interval with saline or plain boiled water. On his return a specimen of serum can be obtained which will show spirochætæ if the patient be suffering from specific disease.

The method of procedure adopted in order to procure such a specimen is much the same for all lesions, but a penile ulcer will be taken as typical.

A syphilitic sore may be said to consist of two parts: 1. An ulcerated centre (Fig. 1, A.) 2. The more or less clean edge around this central ulceration (B), surrounded by an indurated margin (C).

FIG. 1.

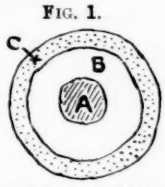


Diagram of a syphilitic sore, showing A, an ulcerated centre, B, a more or less clean edge, and C, a normally indurated margin.

The area richest in spirochætes is the rim of tissue just within the normally indurated margin—that is, the more or less clean edge which encloses the ulcerated centre.

It is not very likely that you will obtain spirochætes from the ulcerated surface in the centre of the chancre, because

[1] A paper by Mr. H. W. Abbott on Some Practical Points in Intravenous Medication, appeared in THE LANCET, Oct. 20th, 1917 (p. 616).

the *Spirochæta pallida* is truly parasitic—it subsists on living tissue; it is not a saprophyte—it does not thrive on dead matter. So it will be wise to obtain the specimen from the area just within the hard margin surrounding the sore. First protect the hands with rubber gloves, and place a bowl of 1-1000 perchloride of mercury solution in a handy position. Next take a swab of lint soaked in sterile water or saline, and cleanse the sore so as to get rid of surface débris, &c. Then dry it. Our object now is to excite the flow of secretion from the ulcer, because the serum in exuding carries with it the *Spirochæta pallidæ*. In order to promote this secretion of serum, several methods have been advocated by different workers, viz.:—

1. Take a dry swab and rub the surface of the ulcer fairly hard.
2. Dab the sore several times with lint or wool soaked in spirit; after a minute or two dry the surface, rubbing moderately hard.
3. Immerse a swab in water or saline as hot as can be borne, wring fairly dry, and apply the hot swab to the sore.
4. Take any instrument with a blunt edge—a spud will do very well, or the back of a scalpel—and *gently* scrape the edge of the sore so as to push the epithelium towards the healthy skin. This manipulation bares the surface without producing much, if any, hæmorrhage.

The final manœuvre in all these methods is to squeeze the sore hard, which is somewhat painful, but is only of momentary duration, and patients do not as a rule complain much. You will by this means express a quantity of secretion with little or no blood.

Now we have the penile sore plentifully bathed with serum. To collect this, take a glass capillary tube, similar to that in which ordinary calf lymph is frequently supplied, and prepare it beforehand thus:—

Break off *both* ends by gently filing and snapping across at the file mark. Put the extremities into the flame of a spirit lamp for a second just to smooth each broken end, which does not then feel sharp to the patient when it is used. Now apply one end to the expressed exudate. Hold the tube nearly horizontal, the serum will run in more freely than if you hold it vertically—gravity will not then be opposed to capillary attraction. Place the end into the exudate only sufficiently far that it be just covered, and as soon as you have exhausted the exudate in one spot go to another, and so coax the secretion into your capillary tube. Usually several tubes can be charged from the serum thus expressed from the chancre; two or three are sufficient. Some authorities advocate the addition of a drop or two of distilled water or normal saline to the exudate before its collection into the capillary tube, on the ground that it renders the serum more attenuated and thus facilitates its collection. For this purpose the serum from the penile sore is first transferred to a microscopic slide and diluted there with the normal saline before being drawn into the capillary tube. The spud or scalpel used for scraping the ulcer can be employed to convey the exudation from the chancre to the slide. You will, however, find that this addition is not necessary if you squeeze the sore really hard. Thousands of specimens have been successfully collected at the Military Hospital, Rochester Row, by following the technique described under headings 3 and 4—the application of a heated swab being the favourite method. Indeed, if pressed for time, sufficient exudation can nearly always be obtained simply by squeezing the sore hard after it has been freed from débris.

When the exudate has been collected gently shake it into the middle of the capillary tube by a movement somewhat similar to that employed in resetting a clinical thermometer. Then seal both ends by means of a spirit lamp. The exudate will show the *Sp. pallidæ* for three weeks.

To obtain specimens from other lesions.—It is rare to fail to find spirochætes in the serum expressed from such lesions as the condylomata, frequently found between the buttocks, moist papules on the scrotum, syphilitic papules on the skin, mucous tubercles on the inside of the mouth, ulcers on tonsils, fauces, &c. In fact, papules no larger than a pin's head have yielded *Sp. pallidæ*. If necessary gently remove the superficial epithelial cells until a raw surface appears, then proceed as you would for the expression of serum from a penile sore. In the case of syphilitic papules on the skin, one can promote a secretion of exudate by a method which was first described by Lieutenant-Colonel L. W. Harrison:—

Remove the superficial layer of cells; heat the bottom of a test tube, smear the open end with vaseline, and apply it as a suction cup. Collect, in a capillary tube as before described, the serum which will be found bathing and swelling the papule. Mucous patches in the mouth are very prolific sources of *Sp. pallidæ*. Instruct the patient to turn his lips or cheeks outwards. The surgeon dries the surface, keeping it free from saliva, and collects the exudate as usual.

Another method of obtaining material for the microscopical search for *Sp. pallidæ* is by gland puncture. This is very useful in cases where the patient presents himself with the sore healed, or plastered over with antiseptics, and with no other syphilitic lesion from which serum can be expressed. The technique is as follows:—

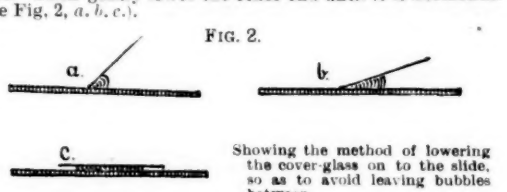
Manipulate the gland with your left hand until it is tightly presenting under the skin. This is easy to do, because the gland is painless. Take a hypodermic syringe, with an intramuscular needle, which is stouter than that ordinarily supplied with the instrument. Pass the needle from above downwards into the middle of the gland, following the oblique line of the groin. You can tell when the needle point is in the gland, because on bodily moving the needle, you will find that you are also bodily moving the gland. In applying this test you must, of course, loosen the hold of your left hand upon the gland. Now force about 10 minims of normal saline through the needle into the tissue surrounding its point—that is, into the centre of the gland, so as to create a space at this spot. Without removing the needle, massage the gland in order to make a mush of tissue and water. Then withdraw the material so obtained, and you have a fluid in which, although blood-stained, *Sp. pallidæ* are very frequently to be found.

The above technique was first described by Mr. C. H. Mills, of the Military Hospital, Rochester Row.

To get the specimen out of the tube take a piece of blotting-paper, fold it and break the tube at one end inside the blotting-paper. If you do not use this protection spiculæ of infected glass may lodge on the skin of the fingers. Hold a microscopic slide in readiness in the left hand, and having gently grasped the tube with light spring forceps, apply the sealed end to the flame of a spirit lamp or a Bunsen burner. The heat, by expanding the air in the tube, expels the exudate on to the slide held in the other hand. Should there be any bubbles in the serum after its expulsion on to the slide, heat the end of the capillary tube and touch each bubble with it, they will disappear. If you consider you have not sufficient exudate add a drop of normal saline or distilled water by dipping a spud, previously sterilised in the flame, in this liquid and mix it with the exudate.

Now place the cover-glass on the specimen, preventing as far as possible, the formation of air-bubbles. It is best done thus: Hold the cover-clip with suitable forceps, Cornet's or Blackley's slide-holding forceps answer very well, and allow one end of the cover-glass to touch the microscopic slide first. Then gently lower the other end until it is horizontal (see Fig. 2, *a, b, c*).

FIG. 2.



Showing the method of lowering the cover-glass on to the slide, so as to avoid leaving bubbles between.

It is much easier to prevent the formation of air-bubbles in the exudate if there be a good-sized drop on the microscopic slide when you let the cover-glass down. This is one of the reasons for the addition of the normal saline. It increases the bulk of the specimen.

Lastly, lay the slide on a flat surface and cover it with a piece of blotting-paper. Press hard, as you would drying a letter. The blotting-paper absorbs any excess of exudate and spreads it *thinly* and evenly under the cover-glass.

The Actual Microscopical Examination for the Detection of Spirochætæ Pallidæ.

The microscope should be fitted with a mechanical stage provided with rectangular movements. It must also have a dark-ground condenser, and many workers prefer a hemispherical condenser to a paraboloid—the former gives keener definition. Swift's hemispherical dark-ground condenser is a very good one. So is Baker's. Leitz's is perhaps the best of all. For illuminating the dark ground Clarke's sub-stage illuminator is quite satisfactory. It works with a 4-volt accumulator, the light is sufficient; moreover, being portable, it can be used anywhere. The bulb is adjustable, and in practice is placed under the condenser. The apparatus is made by Messrs. Hearson and Co., 235, Regent-street, London, W., and the cost is quite moderate. Of course, however, any practitioner who has an installation of

electric light can, if preferred, readily obtain a miniature arc lamp or a Nernst light. Of arc lamps that known as Mills's lamp, and made by Messrs. Wrench and Son, Gray's Inn-road, is a particularly suitable light for the examination of the *Sp. pallidæ* by the dark-ground illumination, but a Nernst lamp, of the pattern made by Leitz, is perhaps more convenient. The light from incandescent gas, properly shaded, can also be used.

The slide having thus been made ready for the examination, the observer should go to the microscope and so adjust the source of light and the mirror that good illumination is obtained, after which the first thing to do is to centre the dark-ground condenser. To do this, bring its surface into sharp definition by use of the lower power objective, say 2 3 inch, and there will be noticed two or three concentric circles marked thereon. Centre these rings in the field of view by means of the screws provided. Next—

1. Rack the condenser down out of the way.
2. Put a large drop of cedar-wood oil on the under-surface of the slide, turn it quickly over to prevent the oil from spreading, and place the slide in position on the mechanical stage.
3. Raise the dark-ground condenser up to the slide until it is actually in contact with it.
4. Still using the low-power objective, bring the specimen into definition, and you will notice in the dark ground a patch of light, which is the focus, more or less sharp, of the condenser. Manipulate the mirror until the light occupies the centre of the field, and then rack the condenser into such a position that the bright area becomes as well defined and brilliant as possible. Then you will have brought the rays from the dark-ground condenser to a sharp focus within the film of exudate.
5. Put a small drop of oil on the surface of the cover-glass and change the 2 3 inch objective for the 1 12 inch oil-immersion lens, and lower this by means of the coarse adjustment until it is very lightly touching the cover-glass.
6. Readjust the mirror if necessary so as to obtain good illumination.

We have, of course, placed the 1 12 inch objective too low, for it is touching the cover-glass. Hence very slowly and carefully raise it until something comes into view. This will most probably be the film of exudate, and it will look like a darkened background in which are seen numerous light spots. Focus this, with the fine adjustment as sharply as is possible. Before critical definition is obtained, however, a little further manipulation of the condenser, mirror, and objective may be found necessary; but by careful adjustment of these three factors you will observe that the specimen becomes keenly defined when a dark-bluish-grey coloured field will be seen, in which are numerous bright, well-defined particles (spores, débris, &c.). These you will notice exhibit Brownian movement, and often travel across the field of view pretty rapidly owing to currents in the film set up by movement. If, however, the specimen is in a state of rest the field of vision, when critically defined, often reminds the writer of the appearance of the starry heavens, the Brownian movement of the microscopic particles being the counterpart of the twinkling of the stars.

You will now know that you have under accurate observation the layer of exudate. You should be able to locate the specimen before the lens has been raised very far. If you have not succeeded in so doing by the time that it has travelled upwards so high that the lens has almost separated from the oil, then you certainly have missed the film, very probably having gone through it so rapidly as not to notice its presence.

If this has happened, very slowly and attentively lower the objective, and you will probably catch a glimpse of the exudate as you move the lens down. If not, continue until the lens is lightly resting on the cover-glass again, and start afresh.

Should the microscopic slide selected be exactly the correct thickness for the condenser you are using (i.e., 1 mm. for the paraboloid, 1·1 mm. for the hemispherical) there will be little or no need for altering its position, and such a slide should always be used. If one which is too thick be employed, the rays of light will be brought to a focus within the glass of the microscopic slide—i.e., below the specimen—and the definition will not be so good as if a thinner one had been selected.

On the other hand, if one uses a slide much too thin, although compensation can be made by lowering the condenser, yet by so doing the circumference of the drop of oil becomes progressively smaller as it is drawn between the separating surfaces of the slide and condenser, and the observer is then apt to get reflection from the edge of this lessened circumference.

Beware of air-bubbles in the cedar-wood oil which you put on the slide. These are often fatal to a satisfactory examination as they diffract the light so much that everything becomes fuzzy. If this should occur, remove the offending material, polish the condenser, and apply fresh oil, more carefully this time!

We have now to search the field for *Sp. pallidæ*. It is best to work systematically. Start from one end of the specimen, and, by means of the screw provided for the purpose, move the slide laterally along through its entire course to the other end. At the same time continuously raise and lower the objective, by means of the fine adjustment, so that the whole depth of the film comes alternately in focus, thus searching the exudate from the top to the bottom as it is travelling along. When you have arrived at the end of the traverse move the slide a short distance at right angles to the direction of the first movement so as to get another portion of the film into view, and continue to work back again, and so on. You will not have continued your examination long before you will be rewarded by seeing one or more silvery-looking spirals appear within the field of observation. Focus one carefully and watch it, keeping the organism always in the centre of the field by altering, as necessary, the position of the slide. If the exudate be examined within a few hours of its collection the *Sp. pallidæ* will be alive, and you will observe some or all of the following movements:—

1. Bending, which is the most marked.
2. Snake-like undulations.
3. Wriggling movements—a twisting of the body to and fro in short curves, like an eel.
4. Occasionally a local wave of contraction may be seen which flattens out some of the spirals.
5. Concertina-like movements by which the spirals are drawn out or approximated, so that the organism becomes lengthened or shortened respectively.
6. Rotation round its long axis like a screw.

Notwithstanding that *Sp. pallidæ* possess rapid local movements, yet they do not travel across the field of view at all quickly; indeed, the parasite often remains in practically the same position for a considerable time. The writer has watched the movements of a *Sp. pallida* for half an hour without having to alter the position of the microscopic slide. This slow locomotion serves to distinguish it from *Sp. gracilis* and *Sp. refringens*, the only other two spirochætes at all likely to be encountered while searching for *Sp. pallida* from lesions other than those in the mouth.

Sp. gracilis is coarser and moves fairly fast, while *Sp. refringens* is much longer and thicker and travels with far greater rapidity.

Although Dr. Mott has succeeded, by taking special precautions, in keeping the *Sp. pallida* alive for 18 hours, yet if the examination be postponed for more than five or six hours the organisms under ordinary conditions will probably be dead. You will then see the spirals, but there will not be any movement other than Brownian motion; and you will notice the spirals number usually about a dozen. If, however, for any reason the actual examination for the detection of the *Sp. pallidæ* be not undertaken by the doctor, then the capillary tube or tubes containing the exudate should be sent carefully packed with wool, in a wooden or metal box, to a pathologist. These outfits for the collection and transmission of specimens can be obtained from any hospital connected with the V.D.A. scheme, or from any pathological institution—e.g., the Clinical Research Association, Watergate House, Adelphi, London, W.C.; the Lister Institute of Preventive Medicine, Chelsea Bridge-road, London, S.W.; the Virol Research Laboratories, 10, Bedford-square, London, W.C.

Do not be misled by a single failure to find the *Sp. pallidæ* into the belief that the patient is free from syphilis, for he may have been exposed to pyogenic organisms, as well as to syphilis. The former element becomes manifest a few days after infection, but the latter may not become apparent until after the lapse of several weeks.

The soft chancre argues a breach of surface at the time of exposure; the all-important thing to determine is whether this solution of surface has been infected with *Sp. pallidæ*. Hence, if a patient appear with a penile abrasion of any description keep him under observation for two months, taking a number of microscopical specimens and testing the blood during the period of observation.

In connexion with this point Professor Mott has added the following note:—

"No venereal ulcer should be regarded as a soft sore until it has been definitely proved, by repeated examinations, that the syphilitic organisms are absent and that subsequently, when sufficient time has elapsed, the blood is found to give a negative complement reaction. I consider this by far the most important statement that can be made, for a large pro-

portion of the cases of tabes and general paralysis are due to undiagnosed syphilis, the so-called soft sores often being really of syphilitic origin."

The one great thing in these early cases is to be able to obtain a rapid diagnosis; and if the general practitioner has neither the time nor the inclination to undertake the microscopical examination himself, then the essential thing required from him, unless he can send the patient to a venereal clinic or a hospital, is to obtain the material for this purpose, and send it to a pathologist. The collection of this exudation is as easy to undertake as it is to obtain a specimen of blood for the Widal test in cases of suspected typhoid fever.

(To be concluded.)

PARIS.

(FROM OUR OWN CORRESPONDENT.)

Increase in Scabies.

THE war has increased the frequency of scabies. Although exact figures are lacking it is a matter of common knowledge that a large number of soldiers suffer from itch. Three special hospitals are reserved in Paris for the treatment of itch: the St. Louis, the Broca, and (since April, 1915) the Cochin; and M. Thibierge's recent report to the Academy of Medicine covers the observations made at them. During mobilisation the number of cases treated sank abruptly as a result of the exodus from Paris of a large proportion of the workers. Among women the figures have varied little, so that, making due allowance for the increase in the female population, calculation of the actual increase in frequency is a simple matter. In comparison with the year 1914 this increase amounts to 350 per cent., distributed among all classes of the population. Among civilians in his own out-patient practice Dr. Thibierge notes an increase in the proportion of cases of itch from 1 to 12 per cent. He accounts for the increase by the present difficulties in connexion with laundry work and the disinfection of blankets and sleeping sacks, possibly also by the contamination of the straw used for the bedding of the soldiers. Among the civil population the increase is attributed largely to infection from soldiers home on leave. Women often develop the condition a few days after the arrival of their husbands on leave. Presumably there is the same risk from the bed linen in the humbler hotels where soldiers pass an occasional night and from the clothing which they put out to be mended. M. Thibierge thinks that some of the less common signs of scabies are not familiar to all doctors, and therefore at times the condition escapes prompt treatment.

Poison Gas and Tuberculosis.

Dr. Marcel Pinard, Médecin-Major of the second class, has made some interesting observations on the effect of the toxic gases employed by the Germans. Certain soldiers after exposure to poison gas have 12 or 15 days later developed severe nettle rash accompanied by œdema, and have later shown signs of tuberculosis at the pulmonary apices. Poison gas is, he thinks, capable of producing rapid development of a focus of latent tuberculosis which might otherwise have remained dormant. This question deserves study in regard to the responsibility of the State in pensioning the victims of poison gas, and accentuates the importance of acute nettle rash, demonstrated as a sign of reaction to tubercle toxin in certain subjects, a peculiarity to which Landouzy first drew attention.

REUBEN HARVEY MEMORIAL PRIZE.—This prize, which is open to all students of the various schools of medicine in Dublin which are recognised by the medical licensing bodies in Ireland and also to graduates or licentiates of these bodies of not more than three years' standing at the time of the award, is given triennially, and the twelfth award will be made on July 1st, 1918. The prize, value £25, will be awarded to the writer of the best essay, on a subject to be selected by the candidate, evidencing original research in animal physiology or pathology. Further particulars may be obtained from Dr. T. Percy C. Kirkpatrick, Fellow and Registrar, R.C.P.I.; Dr. C. M. Benson, Fellow and Secretary to the Council, R.C.S.I.

Public Health.

ANNUAL REPORTS OF MEDICAL OFFICERS OF HEALTH.

County Borough of St. Helens.—Dr. Joseph Cates's annual report for 1916 contains much interesting matter which bears testimony to the good work being done under his direction by the health department of St. Helens. The scheme for the prevention of infant mortality continues to be vigorously prosecuted. The attendance at the maternity centre held in the medical officer's department at the town hall has proved so successful that a second centre is being established in the Marshalls Cross district, and it is hoped that a third, in conjunction with a day nursery, will shortly be opened in premises in Oxford-street. 850 attendances were made by mothers, 864 by infants to the infant welfare centre, and 17 mothers and 47 children were treated in the corporation hospitals. In connexion with post-natal work the health visitors made 4116 first visits and 9057 total visits to infants and young children. As regards ante-natal work, 553 expectant mothers were visited, and almost without exception the visitors were well received. Four expectant mothers were admitted for treatment into the corporation hospitals. In reviewing the work of the year in this department, however, Dr. Cates emphasises the urgent need of greater expenditure and further effort if St. Helens is to lose the unenviable position it holds among towns with a high child mortality. A large amount of work arising out of the war has been carried out by the public health officials. A close inspection has been maintained of premises from which food is supplied to the Army, and inquiry has been made into cases of infectious diseases coming into the borough after discharge from military hospitals. Men suspected to be suffering from tuberculosis have been examined at the request of the recruiting officer, and bacteriological examinations have been conducted in the municipal laboratory. Soldiers suffering from infectious or contagious diseases have been admitted into the corporation hospitals, and the disinfection of billets, bedding, and clothing has been carried out. In Dr. Cates's opinion there are five outstanding requirements which should be carried out if the health of the borough is to be improved: (1) The provision of houses for the working-class and the closing and clearance of certain insanitary areas; (2) the provision of adequate hospital accommodation for maternity and for infectious diseases; (3) the conversion of the pail closets and privies now in use; (4) the abolition of the bricked ashplaces and the provision of closed ashbins; (5) the paving of yards. It will doubtless be difficult or impossible for the borough council to give effect to these recommendations during war-time, but if plans were prepared now the work could be commenced with as little delay as possible after the termination of hostilities.

County Borough of Portsmouth.—In his annual report for 1916 Dr. A. Mearns Fraser expresses the view that the most important health measure of the year was the provision made by the Portsmouth town council for the diagnosis and treatment of venereal diseases. He states that Portsmouth was the first provincial town in the country to prepare a working scheme for this purpose, and his report on the subject, dated September, 1916 (which is given in the annual report), is interesting, and may be briefly summarised. The treatment of these diseases will be carried out at the Royal Hospital under the direction of a specially trained medical officer. The clinic will be held on three afternoons and evenings a week, female patients being seen from 3 30 to 5.0, and male patients from 6 0 to 7.30. These times for attendance may be varied and extended as experience proves necessary. Two beds in the hospital will be provided for male and two for female patients. The medical officer and necessary staff will be appointed by the Royal Hospital committee of management, subject to the approval of the Local Government Board. Laboratory facilities in connexion with the treatment and prevention of venereal disease will also be provided at the Royal Hospital. Salvarsan, or its approved substitutes, will be issued to medical practitioners free of charge by the medical officer of the treatment centre or by the medical officer of health. Apparatus for the purpose of collecting material for examination from sus-

pected patients will be obtainable by medical practitioners on application either to the medical officer of health or to the medical officer in charge of the treatment centre. A committee will be formed, including representatives of various public bodies and voluntary agencies, for the purpose of advising the council in regard to general measures which may be adopted for disseminating information as to the scheme, and generally to advance measures for the control of venereal disease in the borough. Doubtless this scheme, which we understand has been in operation for a considerable time, will have a marked effect on the health of the borough, and it will be interesting to have Dr. Fraser's comments on the subject in his next annual report. The measures adopted for child welfare and the prevention of infantile mortality in Portsmouth have been very successful. During the year under review there were only 80 4 deaths per 1000 births, which is the lowest infantile mortality rate ever recorded in the borough.

County of Warwick.—Dr. A. Bostock Hill's annual report for the year 1916 contains a brief account of the work done by the county health department during the year under review, together with a summary of the annual reports of the district medical officers of health. Despite the depleted condition of the staffs occasioned by the war, much good work has been accomplished by the county and district health departments. To demonstrate the improvement which has taken place in the general health of the county during the past 28 years Dr. Hill, in accordance with his usual custom, gives a table showing some of the more important statistical data for each year from 1889 to 1916. Comparison of the figures for the first and last of these years is instructive. An unfortunate feature, however, is the birth rate, which was 27·92 in 1889, but has now fallen to 21·01, the lowest rate ever recorded. In 1889 the death-rate was 15·07; in 1916 it was only 13·29. The zymotic death-rate in the former year was 1·71, compared with 0·68 in the latter, which is, again, the lowest rate ever recorded in the county. The death-rates from tuberculosis and enteric fever were respectively 1·14 and 0·12 in 1889, while in 1916 they had become reduced to 0·81 and 0·01 respectively. But perhaps the most striking figure of all is that for infantile mortality, which was 128 in 1889 and only 80 in 1916. Dr. Hill and those associated with him in maintaining and improving the public health of Warwickshire are to be congratulated on the increased sanitary well-being which the above figures reveal, and there can be little doubt that the improvement, in large measure, has been brought about by carefully considered and well-directed sanitary effort.

Borough and Port of Lancaster.—The brief comments made by Dr. J. D. Buchanan in his annual report for 1916 on the additional work which continues to devolve upon the public health department of Lancaster as a result of the war and the legislation connected therewith, serve to illustrate the important part played by local authorities and their public health officials throughout the country in the preparations which are essential for the successful prosecution of the struggle in which we are at present engaged. He states that the local munition factories came into active operation about the middle of the year, and that there was thereafter a steady flow of workers into the district. This naturally gave rise to a large number of problems of a social and sanitary nature. Arrangements for the billeting of soldiers, the provision of lodgings for munition workers and their welfare generally, the disinfection of clothing for the military authorities, and the control of infectious disease added considerably to the work of a staff already fully employed. At the request of the Board of Trade Dr. Buchanan, in an advisory capacity, became a member of the local committee on Women's War Employment (Industrial), and devoted much time and attention to matters affecting the welfare of munition workers. In accordance with the Tuberculosis Regulations, 1916, the War Office and the local recruiting office were informed of the names of persons suffering from tuberculosis, and supervision of the food supplied to soldiers also received adequate attention. In view of the circumstances outlined above it is not surprising to learn that a large number of married women in Lancaster who previously were content to remain at home and care for the needs of their families are now engaged in the making of munitions. This has, of course, led to a reduction in the number of breast-fed infants, and although the struggle for existence is less arduous in working-class families the effect on young children cannot be contemplated with equanimity. The establishment of day nurseries is under consideration. A direct outcome of Lancaster's part in the war was the provision of a motor ambulance by the watch committee, the extension of the local infirmary by the erection of a building to accommodate 20 beds, and the action of the tramways committee in obtaining a fleet of electrically propelled motor 'buses for munition workers and residents in the Skerton ward.

URBAN VITAL STATISTICS.

(Week ended Feb. 2nd, 1918.)

English and Welsh Towns.—In the 93 English and Welsh towns, with an aggregate civil population estimated at nearly 17,000,000 persons, the annual rate of mortality was 15·0, against rates declining from 19·6 to 17·1 per 1000 in the three preceding weeks. In London, with a population exceeding 4,000,000 persons, the death-rate was 16·0, or 1·0 per 1000 below that recorded in the previous week; among the remaining towns the rates ranged from 6·2 in Aberdare, 7·2 in Ealing, and 7·5 in Wimbledon to 24·4 in Brighton, 25·0 in Hastings, and 29·7 in Barnsley. The principal epidemic diseases caused 447 deaths, which corresponded to an annual rate of 1·4 per 1000, and included 188 from whooping-cough, 109 from measles, 75 from diphtheria, 58 from infantile diarrhœa, 13 from scarlet fever, and 4 from enteric fever. Measles caused a death-rate of 2·6 in Blackburn, 4·2 in Barnsley, and 4·6 in Norwich; whooping-cough of 1·9 in Wigan, 2·1 in Carlisle, and 2·2 in Gateshead; and diphtheria of 1·4 in Brighton, 1·5 in Bootle, and 3·5 in St. Helens. The 1074 cases of scarlet fever and 1868 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were 34 below and 25 above the respective numbers remaining at the end of the previous week. Of the total deaths in the 96 towns 258 resulted from violence. The causes of 42 deaths were uncertified, of which 8 were registered in Birmingham, 7 in Liverpool, and 4 in Manchester, but not one in London.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual rate of mortality was 14·7, against 17·5 and 17·1 per 1000 in the two preceding weeks. The 310 deaths in Glasgow corresponded to an annual rate of 14·5 per 1000, and included 8 from infantile diarrhœa, 4 from whooping-cough, and 2 each from measles, scarlet fever, and diphtheria. The 90 deaths in Edinburgh were equal to a rate of 14·1 per 1000, and included a fatal case each of measles, diphtheria, and infantile diarrhœa.

Irish Towns.—The 152 deaths in Dublin corresponded to an annual rate of 19·9, or 1·3 per 1000 below that recorded in the previous week, and included 3 each from whooping-cough and infantile diarrhœa, 2 from measles, and 1 from scarlet fever. The 160 deaths in Belfast were equal to a rate of 21·2 per 1000, and included 6 from whooping-cough, 3 each from diphtheria, infantile diarrhœa, and measles, and 1 each from enteric fever and scarlet fever.

(Week ended Feb. 9th, 1918.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 17,000,000 persons, the annual rate of mortality was 15·7, against rates declining from 19·6 to 15·0 per 1000 in the four preceding weeks. In London, with a population exceeding 4,000,000 persons, the death-rate was 16·7, or 0·7 per 1000 above that recorded in the previous week; among the remaining towns the rates ranged from 5·9 in Ilford, 6·0 in Cambridge, and 8·4 in Southend-on-Sea to 23·1 in Norwich and in Halifax, 25·3 in Blackburn, and 29·7 in Barnsley. The principal epidemic diseases caused 482 deaths, which corresponded to an annual rate of 1·5 per 1000, and included 196 from whooping-cough, 150 from measles, 58 from diphtheria, 57 from infantile diarrhœa, 14 from scarlet fever, and 7 from enteric fever. Measles caused a death-rate of 3·5 in Merthyr Tydfil, 4·3 in Halifax, 6·0 in Norwich, and 6·4 in Barnsley; and whooping cough of 1·9 in Wigan and in South Shields, 2·3 in Oldham, and 3·3 in Rotherham. The 1043 cases of scarlet fever and 1686 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were 51 below and 18 above the respective numbers remaining at the end of the previous week. Of the total deaths in the 96 towns 193 resulted from violence. The causes of 28 deaths were uncertified, of which 5 were registered in Birmingham, 5 in Liverpool, 3 in Manchester, and 2 each in St. Helens and Gateshead, but not one in London.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual rate of mortality was 13·9, against 17·1 and 14·7 per 1000 in the two preceding weeks. The 281 deaths in Glasgow corresponded to an annual rate of 13·2 per 1000, and included 7 from whooping-cough, 6 from measles, 5 from diphtheria, and 1 each from scarlet fever and infantile diarrhœa. The 76 deaths in Edinburgh were equal to a rate of 11·9 per 1000, and included a fatal case of infantile diarrhœa.

Irish Towns.—The 113 deaths in Dublin corresponded to an annual rate of 14·8, or 5·1 per 1000 below that recorded in the previous week, and included 7 from infantile diarrhœa and 2 each from measles and whooping-cough. The 123 deaths in Belfast were equal to a rate of 16·3 per 1000, and included 12 from whooping-cough, 8 from measles, and 1 each from diphtheria and infantile diarrhœa.

AT the meeting of the Royal Statistical Society at 9, Adelphi-terrace, Strand, W.C., at 5.15 P.M., on Tuesday next, Feb. 19th, Mr. Geoffrey Drage, will read a paper on the Statistics of Poland and Lithuania.

THE West Ham and Eastern General Hospital at Stratford, which has received its Royal Charter of Incorporation, will now be known as "Queen Mary's Hospital for the East End." The Queen is the patron and Consuelo Duchess of Marlborough the first president.

The War.

THE CASUALTY LIST.

THE following names of medical officers appear among the casualties announced since our last issue:—

Died.

Capt. J. F. Palling, Canadian A.M.C., received his medical education at Trinity College, Toronto, and qualified in 1888. He was in practice at Barrie, Ontario, prior to joining the Canadian Expeditionary Force.

Missing, believed Drowned.

Lieut. C. C. W. Mays, R.A.M.C.

CASUALTIES AMONG THE SONS OF MEDICAL MEN.

The following additional casualties among the sons of medical men are reported:—

Second Lieut. J. A. W. Bigger, East Surrey Regiment, previously reported missing, now officially presumed killed in action, third son of Dr. W. G. Bigger, of Streatham, London.

Probationary Flight Officer W. E. Floyd, R.N., killed in a flying accident, elder son of Dr. W. R. Floyd, of Birkenhead.

Capt. W. B. Cronyn, Army Veterinary Corps, died in hospital of illness contracted on service, third son of the late Dr. J. G. Cronyn, of Dublin.

Lieut. P. G. Cameron, Royal Garrison Artillery, attached Royal Flying Corps, previously reported missing, now reported killed in action, youngest son of the late Dr. J. Cameron, of Lochgilphead, Argyllshire.

THE HONOURS LIST.

The following promotions of and awards to medical officers for valuable services rendered in connexion with military operations in Mesopotamia are announced:—

C.M.G.—Col. (temp. Surg.-Gen.) A. P. Blenkinsop, C.B., A.M.S.

Brevet Lieutenant-Colonel.—Maj. (temp. Lt.-Col.) W. H. Hamilton, D.S.O., I.M.S.; Maj. (acting Lt.-Col.) J. C. H. Leicester, I.M.S.; Maj. W. H. Leonard, I.M.S.

Brevet Major.—Capt. G. G. James, I.M.S.; Capt. J. Phillips, I.M.S.

Distinguished Service Order.—Maj. (temp. Lt.-Col.) R. M. Barron, I.M.S.; Maj. (temp. Lt.-Col.) F. P. Connor, I.M.S.; Maj. (acting Lt.-Col.) C. A. Gourlay, I.M.S.; Lt.-Col. T. B. Kelly, I.M.S.; Maj. E. A. Roberts, I.M.S.; Maj. (acting Lt.-Col.) J. F. Whelan, R.A.M.C.

Military Cross.—Capt. H. L. Batra, I.M.S.; Temp. Capt. R. C. Begg, R.A.M.C.; Capt. J. W. Dalglish, R.A.M.C. (Spec. Res.); Capt. M. Das, I.M.S.; Temp. Capt. R. D. Davy, R.A.M.C.; Capt. P. K. Gilroy, I.M.S.; Temp. Capt. R. H. Hodges, R.A.M.C.; Lt. W. P. Hogg, I.M.S.; Temp. Capt. W. E. Hopkins, R.A.M.C.; Capt. J. W. Maclean, R.A.M.C. (Spec. Res.); Temp. Capt. R. Y. Stones, R.A.M.C.

The following medical officers have been brought to the notice of the Secretary of State for War by the Army Council for very valuable services rendered in connexion with the war up to Dec. 31st, 1917:—

Lt.-Col. H. S. Anderson, R.A.M.C.; Temp. Lt.-Col. A. Balfour, C.M.G., R.A.M.C.; Temp. Col. C. A. Ballance, C.B., M.V.O., A.M.S.; Surg.-Gen. Sir D. Bruce, Knt., C.B., late A.M.S.; Temp. Hon. Lt.-Col. G. S. Buchanan, R.A.M.C.; Maj. and Bt. Lt.-Col. R. M. Carter, I.M.S.; Col. W. Coates, C.B., R.A.M.C. (T.F. Res.); Temp. Hon. Col. Sir J. Collie, A.M.S.; Temp. Col. A. E. Garrod, C.M.G., A.M.S.; Maj. T. W. Griffith, R.A.M.C.; Col. J. Griffiths, R.A.M.C.; Surg.-Gen. F. J. Jencken, A.M.S.; Temp. Hon. Lt.-Col H. R. Kenwood, R.A.M.C.; Temp. Lt.-Col. J. C. G. Ledingham, R.A.M.C.; Col. C. H. Melville, A.M.S.; Col. C. P. Oliver, K.H.P., A.M.S.; Temp. Lt.-Col. G. B. Price, R.A.M.C.; Temp. Hon. Lt.-Col. J. Robertson, R.A.M.C.; Lt.-Col. (Hon Surg.-Col.) (temp. Col.) W. M. Roocroft, R.A.M.C.; Col. and Hon. Surg.-Gen. M. W. Russell, C.B., late A.M.S.; Lt.-Col. A. de C. Scanlan, R.A.M.C. (Res. of Off.); Temp. Col. H. H. Tooth, C.M.G., A.M.S. (Lt.-Col., R.A.M.C., T.F.); Temp. Lt.-Col. C. M. Wenyon, R.A.M.C.

Canadian Army Medical Corps.—Maj. (acting Lt.-Col.) J. A. Amyot; Col. K. Cameron; Col. F. G. Finley; Col. G. S. Rennie; Col. W. A. Scott; Col. W. L. Watt.

Australian Army Medical Corps.—Lt.-Col. J. Gordon; Lt.-Col. (temp. Col.) D. M. McWnae; Hon. Lt.-Col. J. A. Murdoch; Lt.-Col. (temp. Col.) K. Smith.

New Zealand Army Medical Corps.—Lt. Col. T. Mill.

THE PROGRESS OF THE WAR.

Meeting of Parliament.—Parliament began a new session on Tuesday, Feb. 12th. The Speech from the Throne dealt exclusively with the war. In the course of the debate on the Address in the House of Commons Sir W. Watson Cheyne complained of the delays which had occurred in connexion with the report of the Committee which had investigated medical establishments in the Army in France. The report had been sent in to the Army Council two months ago, and he was very much astonished to find the other day that no copy of it had been sent to France. By delay the report would lose its value. He also complained that the Director-General of Medical Services was not given a seat on the Army Council. It was essential that one of the most important parts of the Army machine should be represented on that body.

RELEASE OF MEDICAL STUDENTS.

The new Army Council Instruction (No. 153) just issued defines more precisely than the previous Order (No. 1751) the conditions under which enlisted third-year medical students are entitled to release in order to pursue their studies.

A medical student now serving with the colours who (*a*) is a third-year medical student, and was at the time of his enlistment actively engaged in medical studies; or (*b*) at the time of his enlistment had passed the whole of the professional examination in chemistry, physics, and biology (or botany and zoology) for a medical degree or licence, and was at the time of his enlistment actively engaged in medical studies, is, if eligible and if he so desires, to be transferred (regardless of his medical category) to the Reserve, or discharged if ineligible, for the purpose of resuming his studies with a view to obtaining a medical qualification.

A man who had on or before enlistment completed two years of medical study, and who can within 36 months complete his professional curriculum and obtain his medical degree or licence, is to be regarded as a third-year medical student.

The approving authority for the release is the general officer commanding, unless the student holds a commission, when this officer transmits a statement for the decision of the Army Council.

OBITUARY OF THE WAR.

ALEC ROBB-SMITH, M.B., C.M. GLASG.,

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain A. Robb-Smith, who died on active service in France on Dec. 15th last, was educated at Paisley Grammar School and graduated in medicine at Glasgow University in 1892. After holding house appointments he became medical superintendent of Gockston Small-pox Hospital and of Paisley Infirmary and Fever Hospital, and later the first resident medical officer to the Croydon Fever Hospital. He then settled in general practice, being also public vaccinator for the Forest Gate District of West Ham for many years. When war broke out he was Red Cross lecturer and examiner for a part of Kent, and received his commission in the R.A.M.C. in July, 1915. After a year or more as second in command of the garrison hospital at Woolwich and sanitary medical officer for the garrison, he was sent to France in January, 1917, remaining there until his death.

Captain Robb-Smith's friends write of him as one who was in love with his profession and with its application to human need. "He lived and worked to the height of his energy and a sudden death found him at the post of duty." He married the daughter of James Aitken, of Glasgow, and leaves a widow and two children.

Dr. Francis D. Boyd, C.M.G., has been appointed Consulting Physician to the Army in Egypt, and has left Edinburgh to take up this duty.

THE people of the Argentine Republic have contributed £51,000 in response to the Red Cross appeal on "Our Day." Of this sum, £6000 was collected by the British Women's Patriotic Association in the Argentine.

Correspondence.

"Audi alteram partem.

EXAMINATIONS FOR AMŒBIC DYSENTERY INFECTIONS.

To the Editor of THE LANCET.

SIR,—In your issue of Jan. 5th you published a paper by Captain W. MacAdam, R.A.M.C., on *Entamœba histolytica* infections among British troops in Mesopotamia and India. A more extensive version of the same article, written by the same author in collaboration with Assistant Surgeon R. Keelan, I.S.M.D., had previously appeared in the *Indian Journal of Medical Research*, vol. v., No. 1, July, 1917, and it is stated that yet a third—"a full statistical report"—will shortly appear in the *Journal of the Royal Army Medical Corps*. The two articles which have already appeared contain some criticisms of my work and some deductions from it which appear to me wholly unjustified. Since they have been judged worthy of the widest publicity, I should be grateful if you could give me space in your columns for a brief reply.

I do not propose to enter here into a detailed criticism of Captain MacAdam's general conclusions. On the whole, they are not sufficiently different from those of most other workers in the same field—including myself—for such discussion to be particularly profitable at the present moment. Neither do I think it necessary to offer my criticisms from a purely protozoological standpoint, for views which are at variance with established facts may be trusted to settle themselves. I wish merely to draw attention to some misstatements regarding certain figures which I have myself published. I have not the slightest doubt but that Captain MacAdam's misuse of my figures has been quite unintentional, but I should like to correct an erroneous impression to which his own words may give rise.

In my report to the Medical Research Committee[1] I drew the conclusion—which further investigation has confirmed—that if a series of persons suspected of infection with *E. histolytica* be examined three times per case, then the number of infections actually detected by this means is probably not more than one-half to two-thirds of the number really infected with the parasite.

Of this conclusion Captain MacAdam says[2]:—

"Although the statement that not more than one-half to two-thirds of all infected cases will have been discovered in a series which has been examined three times per case is in all probability mathematically correct, yet from a practical standpoint *it gives an erroneous impression of the position. In this series of 100 infections, cited by Dobell*, the first examination reveals *55·5* per cent., the second 23·7 per cent., and the third 11·1 per cent., while the fourth and fifth examinations give only 3·7 per cent. and 3 per cent. respectively."

A little earlier he had stated:—

"*Dobell himself has shown that of 100 cases*, say, infected with *Entamœba histolytica* which are discovered after five examinations of the fæces, *93·3 of these will be detected at the end of three examinations*."

In the article in the *Indian Journal of Medical Research* a curve (Chart A.) is also given in illustration of these statements; and it is labelled—

"*To show (according to Dobell) how rapidly the number of positive findings decreases with each successive examination.*"

A little later the following conclusion is then drawn:—

"*Hence from Dobell's own figures ..... three examinations seem sufficient* for the detection of all cases of heavy infection."

Now I think anybody reading such statements would suppose that I had myself been responsible for them They could only suppose that the figures which I published showed that three examinations per case were adequate for the detection of the vast majority of infected cases; and that I had—for some obscure and unrecorded reason—advocated six. For Captain MacAdam elsewhere comments unfavourably upon my system of six examinations. The facts, however, are as follows.

Setting aside the minor points that the "series of 100 infections, cited by Dobell," was 135, and not 100; that my conclusion was not drawn from this series of figures; that the percentage of infected cases found at the first examination was 58·5 and not 55·5; and that the misleading curve, "according to Dobell," is not only not mine, but contradicts my explicit statements; I should like to give you my actual words, so that your readers may judge who has been responsible for creating "an erroneous impression of the position." In my report, alluded to above, I gave a table (Table VI., p. 42) which contains the figures quoted by Captain MacAdam. This table is expressly given to show that the opinion—which he now upholds—that three examinations per case will detect the majority of carriers of *E. histolytica* is unjustified, and it can hardly be used to prove the contrary. It shows indeed that, of 135 infected cases, 93·3 per cent. were detected by means of three examinations only. But the reason is also given why such a high proportion was detected by so few examinations.

"*Since it has been the custom not to examine any case more than three times if all three examinations have proved negative, it is only in exceptional circumstances that an infection has been discovered at any examination later than the third. Nearly all infections have, in other words, been detected in three examinations, simply because more were not made.* ..... From this table it will be seen that *no less than 6·7 per cent. of the infections were discovered at the fourth and fifth examinations—and this in spite of a system which usually prevented more than three negative examinations per case being made.*"

The only reasonable conclusion to be drawn from such facts is that three examinations per case are *not* sufficient to detect the vast majority of infections—the conclusion which I drew; and I then endeavoured to ascertain what proportion of the total infected cases was likely to be detected by such a system. Captain MacAdam apparently believes, however, that if *no* case had been examined *more* than three times *all* the infected cases would have been discovered, for his deduction from the same figures is arrived at by a method of reasoning which would lead to this conclusion.

In order that there could be, as I thought, no possible misinterpretation of my figures I particularly emphasised their significance; and, as will be noticed, not once, but three times, indicated the fallacy into which Captain MacAdam has fallen. I may also add that in dealing elsewhere with a part of the same series of figures, Dr. A. C. Stevenson and myself again indicated their obvious meaning in similar terms.[3]

At the time when my report was written there were not sufficient data to determine exactly what percentage of infected cases would be detected by a series of three examinations per case, though it seemed probable that it would not be more than about 50 to 66 per cent. Some valuable data have, however, since been obtained by the workers at Liverpool. They agree quite closely with my conclusions, and render it highly probable that, on a system of three examinations per case, *at least 35 per cent.* of the infected cases would escape detection—not 6·7 per cent., as Captain MacAdam would argue.[4]

There is only one other point in Captain MacAdam's articles to which I would refer. He has examined very many of his cases, it appears, once only. As most people now realise, and as I emphasised repeatedly in my report, single examinations of cases are apt to be very fallacious data for statistical purposes. Captain MacAdam seeks to overcome this difficulty by applying what he calls "Dobell's figure for correction" to his actual findings. He thus calculates, for example, that in a series of cases in which 13·6 per cent. of infections were detected by one examination the true incidence of infection was 34 per cent. I should like to point out that I have never published any coefficient, or method of calculation, which will enable conclusions of this sort to be drawn. I do not myself know how it is possible to state precisely, as a result of examining a series of cases once each, what the real incidence of infection is. From the figures at my disposal I believe it to be impossible, and I believe I can, if necessary, demonstrate that this is so. "Dobell's figure for correction" is Captain MacAdam's. For my own part, I regard it with suspicion, and would disclaim all complicity in calculations made with its assistance.

[1] Medical Research Committee, Special Report Series, No. 4, 1917.
[2] In the ensuing quotations I have italicised the passages to which I particularly wish to direct attention.
[3] Medical Research Committee, Special Report Series, No. 5, p. 100.
[4] See Carter, Mackinnon, Matthews, and Malins Smith, Ann. Trop. Med. and Parasitol., vol. xi., No. 1, June, 1917, p. 27.

Lest the foregoing comments appear wholly condemnatory of Captain MacAdam's articles, I should like to add that these undoubtedly contain many interesting and valuable observations. I have singled out for criticism merely certain passages which are directed against my own work or which, albeit unwittingly, misrepresent it. It seems to me necessary to reply to them because they are, as they stand, misleading; and their repetition can only lead to the perpetuation of errors which my fellow workers and I have long been striving to eradicate. From various phrases in his writings I think that Captain MacAdam has misconceived the scope and purpose of my report. If he finds that its subject-matter and conclusions are not exactly the same as his, I would ask him to remember that the problems presented by amœbic dysentery are not the same in India and Mesopotamia as in this country. If he finds certain of my conclusions inapplicable or valueless in India, I would remind him that some of his own conclusions—correct though they may be—are equally irrelevant and unhelpful to us in England. It is of little assistance to workers in this country, for example, to be told that amœbic dysentery is the affair of the epidemiologist and sanitarian. We have no difficulty in accepting such statements, in their proper context, but epidemics and sanitary arrangements are not the primary problems which have confronted us in England. When Captain MacAdam condemns some of my conclusions as "theoretically and statistically sound" but "from a practical standpoint, faulty and unreliable," I would remind him that, in my own case, theory has not been so wholly divorced from practice as he appears to believe. And I would further ask him to remember that what, for him, may be "impracticable" and "futile" in India, may conceivably appear in a different light to those who have put it into practice in England.

I am, Sir, yours faithfully,

Jan. 29th, 1918. CLIFFORD DOBELL.

THE TUBERCULOSIS PROBLEM IN INDIA.

To the Editor of THE LANCET.

SIR,—While a great deal has been written on the prevalance of tuberculosis in Europe and America, comparatively little is known as to the extent of the disease among the teeming millions of India. The history of tuberculosis in India dates back from times of remote antiquity. References as to its incidence and treatment are found in the classical works of Charaka and Susruta, the Indian physicians of pre-Buddhist period. Modern civilisation has made a revolution in the industrial, economic, and social life of the Indian people which has greatly contributed to the increase of tuberculosis, especially during the last 30 or 40 years. Increased facilities for travel, the opening of manufacturing centres, schools, colleges, Government offices, factories, and workshops all over the country have helped to deplete the villages and swell the population of towns, bringing in their turn the evils of overcrowding, dear rents and dear food, slums and insanitation. So dense is the population in some parts that in Cawnpore 563 persons are living to the acre, and 76 per cent. of all families in Bombay dwell in one-room tenements. Owing to rapid growth of cities, the absence of free grazing lands as was the custom in the olden times, and increased expense of feeding cattle, the very common articles of food, such as milk, butter, ghee (clarified butter), &c., have not only rapidly advanced in prices, but are shockingly adulterated. When one considers that the prevailing rate of wages for millions of unskilled labourers is not more than two to four pence a day, one can see that any increase in the cost of the bare necessaries of life soon overreaches the margin of subsistence, and must result in poverty and underfeeding. Besides overcrowding, insanitation, poverty, &c.—causes which act more acutely in the East than in the West—the primitive life and habits of the people, once apparently harmless, have now favoured the spread of tuberculosis in India. The mud houses with mud floors in hundreds of Indian villages, harbouring dust and dirt; the joint family system, where big families live together making overcrowding and poverty still more deplorable; the purdah system, where women are secluded in the dark and dingy parts of the house; the early marriage, which saps the vitality of thousands of young men and maidens; the indiscriminate spitting—are some of the factors which have lowered the resisting powers of the people and opened the door to tuberculosis. To complete the picture, the poor physique of many of the Indian races and their increased susceptibility to consumption from presenting a virgin soil to the disease, the tropical heat and dust, the ravages of malaria, the adoption of European standards of living among the well-to-do classes, and the increased consumption of alcohol, have also aggravated the evils of tuberculosis. No wonder the disease is prevalent throughout the length and breadth of India. In fact, the mortality in cities like Bombay and Calcutta is considerably higher than in Glasgow, Birmingham, and Manchester. It is much more common among the female than the male population, owing to insufficiency of air and light in the zenanas. It is sad that in places like Calcutta the deaths from consumption are twice as much among Indian women as among men, and that hundreds of young mothers in their teens annually succumb to the disease after childbirth. After a careful study in India the writer has come to the conclusion that the yearly mortality from tuberculosis cannot be less than 900,000 to a million—i.e., India loses annually a number equal to the population of Bombay or Calcutta.

Remedial measures: General.—The problems presented by tuberculosis among three hundred millions of Indian people are, indeed, gigantic. It is only by studying all the medical, hygienic, social, and economic factors in a broad, philosophic but practical spirit that we can hope to devise measures to cope with the disease. On the one hand, we should not set up panic legislation and frighten the people with violent propaganda and hasty measures. On the other hand, ignorance and superstition must be fought, the sympathies of the people enlisted, and they should be educated on lines of hygiene and sanitation. The very fact that the Indian troops, who are better fed, better housed and clothed, show a much reduced tuberculosis mortality compared to their neighbours, who are scantily clothed, ill fed, and badly housed, is a strong proof that environment plays an important factor in the causation and cure of tuberculosis. So the well-being of the people should be secured and maintained by improving their rate of wages, their housing and sanitation. Efforts should be made to keep the people in the country, and revive village life and its arts and handicrafts, its dairy and agricultural industries, which would cheapen dairy produce, the staple food of the people.

Special.—I can only just touch on the three main lines of treatment which I advocated in India: (*a*) Central bureaux; (*b*) sanatoria, special or home hospitals; (*c*) health or village colonies.

The first will concern itself in giving information, visiting cases, and sorting out patients. In the second there is provision for special hospitals for tuberculosis outside cities carried on on open-air lines. Many Indians have a horror of being treated in hospitals or of leaving homes and friends to go to distant sanatoria. So sanatoria will not be popular unless provision is made to allow some relative to accompany the patient to cook food according to caste rules and give general attendance. Such a provision will be very much like the Home Hospital experiment in New York City, where the family instead of being left behind accompanies the patient to the hospital. The first two are only palliatives. The third line of treatment aims at the prevention of the disease. It is nothing less than the erection of new villages somewhat on the lines of garden cities in England, where those suffering from consumption or threatened with it may go and live with their families under ideal conditions. These village colonies or settlements built outside cities or far away, according to climate, altitude, and other requirements, would contain groups of cottages or houses with gardens, and provided with wide thoroughfares and parks, a hospital, a sanatorium, a school or schools where children would be taught in the open air, a farm, a dairy, shops, temples and mosques, a public hall—in fact, each village would be self-contained with all the modern improvements in hygiene and sanitation, and available for all those who wish to live the open-air life for the cure and prevention of disease. Such a scheme of health colonies undertaken by municipalities or private philanthropists would go a long way towards solving many of the problems connected directly or indirectly with tuberculosis. I hear that an attempt is already being made to build such a garden city. We want many of them. It is the only rational and abiding means of dealing with the prevention of tuberculosis both in India and in England.—I am, Sir, yours faithfully,

C. MUTHU, M.D.,

Jan. 28th, 1918. Chief Physician, Mendip Hills Sanatorium, Wells.

THE DISTRIBUTION OF THE RASH IN SMALL-POX.

To the Editor of THE LANCET.

SIR,—In your deservedly appreciative obituary notice of Dr. Thomas Frank Ricketts, medical superintendent of the Park Hospital, Hither Green, in THE LANCET of Feb. 9th, you state that his monograph on the "Diagnosis of Small-pox" (published in 1908) "arranged and systematised the hitherto amorphous information on the distribution of the small-pox eruption." You go on to show that "his observations gradually crystallised into the now well-recognised principle that the incidence of the rash varies with the degree of irritation and vascularity of the skin."

In justice to the revered memory of my master and friend, Dr. William Stokes, F.R.S., physician to the Meath Hospital, Dublin, and Regius professor of physic in the University of Dublin, I feel constrained to draw your attention and that of your readers to the following passage in my book on "The Eruptive and Continued Fevers," published by Messrs. Fannin and Co., Grafton-street, Dublin, in 1892, pp. 83 and 84:—

"It is right to mention that in confluent small-pox, while the face and hands may be absolutely covered with pocks, in other parts of the body the eruption may be more or less discrete, the amount and intensity of the pustulation seemingly being in direct proportion to the vascularity and inflammatory state of the surface. This was pointed out several years ago in an admirable paper on the Treatment of Small-pox by the late Dr. William Stokes, Regius Professor of Physic in the University of Dublin (see the *Dublin Journal of Medical Science*, vol. liii., p. 9, 1872). Of this fact we have two proofs—in the first place, portions of skin which have been subjected to mechanical or chemical irritation, either before infection or during the stage of incubation, invariably throw out a very abundant pustular, and frequently a confluent eruption even in discrete cases of small-pox. Conversely, and secondly, where the vascularity of a part has been reduced by pressure, local depletion, or removal of irritation by poulticing, bathing, or other means, the eruption of small-pox is distinct even in confluent cases."

In his paper Dr. Stokes gave convincing evidence of the soundness of the above views from his personal clinical observations in various epidemics of small-pox before the days of compulsory vaccination. In the more recent outbreaks of 1871–73 and of 1876–79 I had abundant opportunities of confirming his conclusions in the wards of Cork-street Fever Hospital, Dublin. To those wards in the former of these modern epidemics the small-pox admissions numbered 746 in the 12 months ended March 31st, 1872, while in the latter outbreak 1804 patients were treated at Cork-street Hospital by my colleagues, the late Dr. Charles F. Moore, the late Dr. Reuben J. Harvey, and myself, in the three years ended March 31st, 1879.

I am, Sir, yours faithfully,

JOHN W. MOORE, M.D., F.R.C.P.I., D.P.H.

Dublin, Feb. 9th, 1918.

GRADUATED EXERCISE IN PROGNOSIS.

To the Editor of THE LANCET.

SIR,—Dr. Thomas Lewis's stimulating paper in your issue for Feb. 2nd is of interest to me, for in the discussion upon D.A.H. at the Royal Society of Medicine in 1915 I put forward as a result of my experience in pre-war days the view that one class of D.A.H.—viz., that of overgrown young recruits—would benefit by a more careful supervision of their training. The suggestion was obvious to any who had been concerned with athletics but met with no support or comment from others either then or later. Now we have evidence of the value of training on a far wider scale and in a wider sense than I had either the knowledge or perspicuity to realise. This paper attracts me particularly because in a large group of these cases of D.A.H. I imagine a disturbance between the balance of the heart beat and the numerous nervous influences that impinge upon the heart. I had been convinced that no exercises in the world carried out *in peaceful surroundings* could touch this weak point. I felt that one of these cases might with training carry out strenuous exercises with success, but put him under shell-fire and the rift in his mechanism would at once, or rapidly, become again apparent. Had Dr. Lewis terminated his course of training by obtaining some batteries with high-explosive shells to fire during the exercises, I should have felt convinced of my error. Now, however, without this crucial test we have statistical evidence, and the inference, I take it, must be that this rift in the mechanism can be mended by graded exercises toning both heart and nerves. That there is some such rift is amply proved by the effect of air raids on convalescent cases of D.A.H. In pre-war days I think I have heard laughter over the value of physical exercises in heart affections, but now the times have greatly changed. Lastly, I would venture to reassert the opinion that, save for purposes of investigation, the grouping together of D.A.H. cases in one ward or institution is not advisable.

There is a point connected with D.A.H. which I believe to be important, and put forward for consideration. 1. There are in our public schools a great number of growing boys whose lives and health are of vital importance to the nation. 2. In these schools there are numerous sections of the O.T.C. working with the zeal and enthusiasm we associate with public schools and their masters. 3. In these schools, as elsewhere, there will be food difficulties. We have here the elements for the production of D.A.H. unless considerable discretion is exercised.

Whether or not the authorities will be convinced by Dr. Lewis's statistics and institute graded exercises on a vast scale is not for me to discuss. Statistics, we know (even military ones), often lead to cavilling; but I sincerely hope precautions will be taken not to manufacture D.A.H. in growing boys, which will be a greater disaster than the uncertain cure of a definite victim is a triumph. That this danger is not a mare's nest I will support by an illustration known to all experienced cricketers, that many a promising young fast bowler has been ruined early in his career by overtaxing him prematurely.

I am, Sir, yours faithfully,

Devonshire-place, W., Feb. 5th, 1918. F. JOHN POYNTON.

THE LATE DR. MAUDSLEY.

To the Editor of THE LANCET.

SIR,—Will you allow me to make a correction of one omission in your most interesting and worthy appreciation of the pre-eminent position that Dr. Maudsley won for himself amongst English medical philosophers. In your account of his published works (see THE LANCET, Feb. 2nd, p. 193) you do not mention his *first* book, the "Physiology and Pathology of Mind," *in one volume*, that was published by Messrs. Macmillan in the year 1867. In 1868 this book was being read in Oxford by some students of philosophy going in for Classical Greats (not by *medical* students, for there were then practically none of them in Oxford). I remember devouring this book myself; but I long since lent it and lost it. It contained the implicit germ of much that was developed in Maudsley's latest book—"Organic to Human," published in 1916, when he was over 81. I am, Sir, yours faithfully,

Feb. 6th, 1918. H. BRYAN DONKIN.

THE CAUSE AND PREVENTION OF MYOPIA.

To the Editor of THE LANCET.

SIR,—Dr. Edridge-Green, in your issue of Jan. 26th, informs us that myopia is caused by increased intra-ocular pressure, due to an obstruction to the outflow of lymph. Some years ago I made an investigation into the etiology of myopia. It extended over two years, and involved the examination of 1500 consecutive cases. In my table there are 992 females and only 508 males. Among the school children on my list the percentage of females is 59. At the age of puberty the percentage rises and it increases from this onwards, giving in my cases a ratio of two females to one male—a ratio suggesting sex limitation. After my paper was published (*Brit. Med. Jour.*, August 29th, 1914), Dr. James Kerr, of the London County Council, informed me that he also had observed and recorded the same peculiarity. I found that myopia was transmitted from father to son in 79 cases; from father to daughter in 149 cases; from mother to son in 111 cases; from mother to daughter in 231 cases. Myopia is much more prevalent among those who do no heavy work or take no violent exercise. If physical conditions have anything to do with the production of myopia then monocular myopia is a monocular result from binocular

conditions. Monocular myopia, if not due to keratitis, is usually found in one of the parents. In buphthalmia there is increased intra-ocular pressure and the coats of the eyeball yield, especially the less resisting parts, the optic disc and the sclero-corneal junction, but in myopia the more resisting part yields and not the less.

I am, Sir, yours faithfully,

J. A. WILSON.

The Lord Derby War Hospital, Warrington, Feb. 7th, 1918.

THE FOOD-RATIONING SCHEME AND DIABETIC PATIENTS.

To the Editor of THE LANCET.

SIR,—At a largely attended meeting of the Balham and District Medical Society held this week the new food-rationing scheme was discussed. The point was raised that no provision had apparently been made for the modification of the ordinary ration allowance of food by medical or other certificate. The case of the diabetic was cited, and the opinion of the meeting was that the proposed weekly allowance of meat would need to be increased for such patients. Other examples of necessity for modification of the food allowance will occur at once to the medical mind. Perhaps you, Sir, will be able to take steps in the matter with the Ministry of Food.—I am, Sir, yours faithfully,

CARRUTHERS CORFIELD,
Honorary Secretary.

Feb. 11th, 1918.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

Staff-Surgeons to be Fleet-Surgeons: L. M. Morris, A. K. Smith, Shand, J. Fullarton, W. N. L. Cherry, J. G. Peebles, T. W. Myles, E. R. L. Thomas.

To be temporary Surgeons: G. H. Sims, A. L. Johnston.

ARMY MEDICAL SERVICE.

Surg.-Gen. J. C. Culling, C.B., is placed on retired pay.

Col. T. H. J. C. Goodwin, C.M.G., D.S.O., to be Surgeon-General, vice Surg.-Gen. T. J. O'Donnell, C.B., D.S.O., ret., and to be Deputy Director-General.

Lieut.-Col. J. V. Forrest, C.M.G., to be temporary Colonel whilst employed as Deputy Director of Medical Services, Lines of Communication.

ROYAL ARMY MEDICAL CORPS.

The undermentioned are granted temporary rank:—As Lieutenant-Colonel: G. J. Johnston. As Majors: Sir Arthur C. K. Ball and L. Kidd. As Captain: A. E. Boyd.

Temp. Capt. R. J. Rowlette to be temporary Lieutenant-Colonel.

The undermentioned retain the acting rank of Lieutenant-Colonel whilst commanding a Medical Unit: Major E. B. Knox and Temp. Capt. R. E. Drake-Brockman.

Major P. J. Marett to be acting Lieutenant-Colonel whilst in command of a Medical Unit.

Majors to be Lieutenant-Colonels: (Brevet Lieut.-Col.) C. E. P. Fowler, (Brevet Lieut.-Col.) H. A. Berryman, G. S Mansfield.

Major E. L. Moss, M.C., retains the acting rank of Lieutenant-Colonel whilst specially employed.

Temp. Hon. Major G. Dreyer to be temporary Honorary Lieutenant-Colonel.

Temp. Major S. C. Elgee to be temporary Lieutenant-Colonel whilst employed at the Manor (County of London) War Hospital.

Captains to be acting Lieutenant-Colonels whilst in command of a Medical Unit: F. Casement, D.S.O., J. G. Gill, M.C.

Temp. Capt. R. T. Smith to be temporary Major.

Temporary Captains, Can. A.M.C., to be temporary Majors: W. L. Shannon, F. G. Logie, (Acting Major) J. W. Hutchinson, (Acting Major) H. C. Burgess, J. C. Wickham.

Temp. Hon. Capt. M. W. Flack to be temporary Honorary Major.

Temp. Hon. Capt. E. H. Hicks to be temporary Honorary Major whilst serving with British Red Cross Society in France.

To be temporary Captains: S. E. Beech (Can. A.M.C.), G. B. Wiswell (Can. A.M.C.), Temp. Major A. Stirling (Can. A.M.C., from New Brunswick Regiment), Temp. Lieut. R. Semple, R. M. Brontë.

Temporary Lieutenants to be temporary Captains: H. W. Windsor-Aubrey, O. Barton, N. Navarra, W. E. Peck, A. J. B. Leckie.

L. W. Oliver, late temporary Lieutenant, is granted the honorary rank of Lieutenant.

Officers relinquishing their commissions: Temp. Capts. J. R. Forde, R. L. Norman (on account of ill-health contracted on active service), E. J. Leary (Can. A.M.C.), W. J. Weaver, M. Ffoulkes, D. S. Steele-Perkins (on account of ill-health). Temp. Hon. Capt. J. R. Taylor. Temp. Hon. Lieuts. J. F. Harvey, R. G. Carothers, C. K. Valade.

SPECIAL RESERVE OF OFFICERS.

To be Lieutenants: W. O. Holst, from University of London Contingent, O.T.C., and W. A. Fraser, from St. Andrews University, O.T.C.

TERRITORIAL FORCE.

Major W. F. McAllister-Hewlings, from Deputy Assistant Director of Medical Services, to be Major.

Major J. D. Comrie and Capt. H. A. B. Whitelocke are seconded.

Capt. S. J. Clegg is seconded whilst holding an appointment as Deputy Assistant Director of Medical Services.

Capt. (acting Lieut.-Col.) A. Leggat, D.S.O., relinquishes his acting rank on ceasing to command a Field Ambulance.

Capt. F. C. Bentz resigns his commission on account of ill-health contracted on active service, and is granted the honorary rank of Captain.

Capt. G. J. E. Trotter resigns his commission on account of ill-health, and is granted the honorary rank of Captain.

Temp. Lieut. E. B. Kersley, from 2nd Battalion, Shropshire Volunteer Regiment, to be temporary Captain, Shropshire Medical Volunteer Corps.

Medical Officer and Temp. Capt. A. Eddowes, 21st Battalion, County of London Volunteer Regiment, resigns his commission on account of ill-health.

H. T. Benson to be Medical Officer and temporary Lieutenant, 2nd Battalion, Lincolnshire Volunteer Regiment.

J. Williamson (late Lieutenant, 3rd Battalion, Lincolnshire Volunteer Regiment) to be temporary Lieutenant, Lincolnshire Medical Volunteer Corps.

TERRITORIAL FORCE RESERVE.

Col. C. E. Harrison, C.M.G., C.V.O., from Army Medical Services, to be Colonel.

Capt. C. Killick, from a Field Ambulance, to be Captain.

Lieut.-Col. J. Young, from a Field Ambulance, to be Lieutenant-Colonel.

Medical News.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH: THE PROPOSED MINISTRY OF HEALTH FOR SCOTLAND.—The Council of the College has had the impending Ministry of Health under consideration since the creation of the new department was first authoritatively stated to be intended, and at a statutory meeting of the Fellows held on Feb. 5th the Council submitted a report on the whole matter, when, and after free discussion, five pertinent recommendations were adopted unanimously, being in substance: (1) that the College cordially supported the formation of the Ministry, which should deal with all matters bearing upon national health; (2) that the Ministry for Scotland, with direct Parliamentary representation, should be apart from that for England and Wales; (3) that the duties and powers of the Local Government Board for Scotland should be extended for the purpose, the Secretary for Scotland being the Minister of Health; (4) that any Bill before submission to Parliament should be shown for purposes of consultation to the College and other representative medical bodies; and (5) that it would not be expedient to complete the necessary enactments before the close of the war.

MEDICO-PSYCHOLOGICAL ASSOCIATION OF GREAT BRITAIN AND IRELAND.—The general meeting of this association will be held on Thursday next, Feb. 21st, at 2.30 P.M., at the Maudsley Hospital (4th London General), Denmark Hill, London, S.E., Lieutenant-Colonel David G. Thomson, R.A.M.C., presiding. On the morning of the same day, at 11, Chandos-street, W., there will meet the Educational and Parliamentary Committees. Council meeting at 11.45 A.M. A paper on War Psychoses and Psycho-neuroses will be read by Lieutenant-Colonel F. W. Mott, who will also give a demonstration of the Microscopic Changes in the Brains of Fatal Cases of Shell Shock and Gas Poisoning. It is hoped that Professor Marinesco, of Bucharest, will give a Microscopic Demonstration. During the afternoon visitors will be conducted round the hospital by Lieutenant-Colonel Mott.

CENTRAL COUNCIL FOR DISTRICT NURSING IN LONDON.—The annual meeting of the Council is to be held in the Conference Hall, Local Government Board, London, S.W., at 2.30 P.M., on Tuesday, Feb. 26th, when Mr. Hayes Fisher will preside, and the third annual report will be presented.

THE LATE DR. CHARLES ADAM.—The death occurred at St. Giles, Elgin, on Feb. 3rd, of Charles Adam, M.A. Aberd., M.D., after a short illness, at the age of 74. Dr. Adam was a son of the late Mr. Adam, of Lossiemouth, and received his education at Birnie and Elgin Academy, and afterwards at the University of Aberdeen, where he passed a brilliant studentship, taking the M.B., C.M. degree in 1868 with the highest honours, and the M.D. degree in 1881. He practised in Grantown for a short time, but settled in Elgin, where he subsequently carried on an extensive practice. He was much esteemed, the whole of his life being devoted to the interests of his profession and the welfare of his patients, to whom he gave of his best. Keeping himself abreast of developments in medical science, he commanded the confidence of his confrères, among whom he was recognised as a highly-skilled practitioner. Although he took no active part in local affairs, he was always keenly alive to everything that concerned the public welfare, while his wide knowledge of matters outside his profession was occasionally embodied in prose and verse in the public press. He was physician at General Anderson's Institution, medical officer for the parish of Birnie, and a justice of peace for the county. He is survived by a widow.

Medical Diary for the ensuing Week.

SOCIETIES.

ROYAL SOCIETY, Burlington House, London, W.

THURSDAY, Feb. 21st.—Papers:—Lord Rayleigh, O.M.: On the Scattering of Light by Spherical Shells, and by Complete Spheres of Periodic Structure, when the Refractivity is Small.—Sir Joseph Larmor: On the Nature of Heat as directly Deducible from the Postulate of Carnot.—Mr. J. J. Guest: Curved Beams (communicated by Prof. W. E. Dalby).—Dr. A. E. H. Tutton: (1) On Monoclinic Double Selenates of the Iron Group; (2) Selenic Acid and Iron. Reduction of Selenic Acid by Nascent Hydrogen and Hydrogen Sulphide. Preparation of Ferrous Selenate and Double Selenates of Iron Group.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

Tuesday, Feb. 19th.

GENERAL MEETING OF FELLOWS, at 5 P.M.

Ballot for Election to the Fellowship. (Names already circulated.)

MEETINGS OF SECTIONS.

Monday, Feb. 18th.

ODONTOLOGY (Hon. Secretaries—F. N. Doubleday, J. Howard Mummery): at 7.30 P.M.

Casual Communication:

Capt. Kelsey Fry, R.A.M.C., and Lieut. H. M. Johnston, R.A.M.C.: Demonstration of Lantern Slides and Radiographs to Illustrate the Technique Employed in the Radiography of Injuries of the Lower Jaw (Mandible). (From the Queen's Hospital, Sidcup.)

Paper:

Dr. Howard Mummery: Tubular Enamels.

Tuesday, Feb. 19th.

PATHOLOGY (Hon. Secretaries—Gordon W. Goodhart, J. A. Murray) at 5 P.M.

Papers:

Dr. J. W. Cropper: Note on a New Counting Chamber for the Enumeration of Protozoa and other Organisms.

Dr. J. A. Murray: (1) Autologous Grafting in Malignant and Non-malignant Conditions; (2) Demonstration of Tumours from the Zoological Gardens.

Wednesday, Feb. 20th.

HISTORY OF MEDICINE (Hon. Secretaries—J. D. Rolleston, Charles Singer): at 5 P.M.

Papers:

Dr. Charles Singer: English Medicine before the Normans.

Dr. R. Hingston Fox: A Budget of Post-mortem Records, 1813-1821: Dr. Mathew Baillie's Foundation Work in Morbid Anatomy.

Exhibition of Books, Pictures, &c. (at 4.30 P.M.).

Thursday, Feb. 21st.

DERMATOLOGY (Hon. Secretaries—J. E. R. McDonagh, Henry MacCormac; Hon. Acting Secretary—S. E. Dore): at 5 P.M.

Cases:

Dr. Graham Little: (1) Rodent Ulcer; (2) Linear Lichen Planus in a Child.

Dr. S. E. Dore: Alopecia Areata.

And other cases.

NEUROLOGY (Hon. Secretaries—C. M. Hinds Howell, E. G. Fearnsides): at 8.30 P.M.

A CLINICAL MEETING of the Section will be held at the London Hospital, Whitechapel, E.

A Series of Cases of Wounds of the Nervous System will be demonstrated by Dr. Head; the demonstration to be followed by a General Discussion, in which it is hoped as many Members as possible will join.

Will Members please note that the Meeting will be held on Thursday, Feb. 21st (instead of the 28th), at 8.30 P.M. punctually.

Friday, Feb. 22nd.

STUDY OF DISEASE IN CHILDREN (Hon. Secretaries—A. S. Blundell Bankart, G. E. C. Pritchard, C. P. Lapage): at 4.30 P.M.

Cases will be shown.

HUNTERIAN SOCIETY, at the Royal Society of Medicine, 1, Wimpole-street, W.

WEDNESDAY, Feb. 20th.—5 P.M., Annual Oration:—Dr. O. K. Williamson: The Symptoms which Precede and are Associated with General Arterio-Sclerosis.

ROYAL MICROSCOPICAL SOCIETY, 20, Hanover-square, W. 1.

WEDNESDAY, Feb. 20th.—8 P.M., Experimental Demonstration:—Prof. B. Moore: Photo-syntheticAction induced in Living Cells, and their Products.—Col. Rawson: Illustrations of Preparations.

MEDICO-PSYCHOLOGICAL ASSOCIATION OF GREAT BRITAIN AND IRELAND, 11, Chandos-street, Cavendish-square, W.

THURSDAY, Feb. 21st.—2.30 P.M., General Meeting: at the Maudsley Hospital (4th London General), Denmark-hill, London, S.E. Paper:—Lieut.-Col. F. W. Mott, R.A.M.C.: War Psychoses and Psychoneuroses; and Demonstration of the Microscopic Changes in the Brains of Fatal Cases of Shell Shock and Gas Poisoning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East.

THURSDAY, Feb. 21st.—5 P.M., Milroy Lectures:—Dr. H. R. Kenwood: The Teaching and Training in Hygiene and Public Health—Some Criticisms and Suggestions. (Lecture I.)

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.

MONDAY, Feb. 18th.—5 P.M., Arris and Gale Lecture:—Prof. F. G. Parsons; Research on the Structure of the English Skull.

WEDNESDAY AND FRIDAY.—5 P.M., Hunterian Lectures:—Prof. E. K. Martin: Projectile Fracture of Limb Bones.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.

MONDAY, Feb. 18th.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye. Dr. Simson: Diseases of Women.

TUESDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.

WEDNESDAY.—10 A.M., Dr. Arthur Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

THURSDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye.

FRIDAY.—10 A.M., Dr. Simson: Gynæcological Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.

SATURDAY.—10 A.M., Dr. Arthur Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. Mr. B. Harman: Eye Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N. 15

MONDAY, Feb. 18th.—2.30 P.M., Children's Diseases: Dr. T. R. Whipham. Gynæcological Diseases: Mr. F. L. Provis. Surgical Operations: Mr. E. Gillespie. 3 P.M., Medical In-patients: Dr. R. M. Leslie. 7 P.M., Venereal Clinic: Dr. Kinsella.

TUESDAY.—10 A.M., Surgical Operations: Mr. J. Howell Evans. 2.30 P.M., Medical Out-patients: Dr. A. G. Auld. Surgical Out-patients: Mr. Howell Evans. Nose, Ear, and Throat Diseases: Mr. C. H. Hayton. X Rays: Dr. Metcalfe. 3.30 P.M., Medical In-patients: Dr. A. J. Whiting.

WEDNESDAY.—2.30 P.M., Medical Out-patients: Dr. T. R. Whipham. Diseases of the Skin: The Dermatologist. Eye Diseases: Mr. A. S. Worton. Operations:—Nose, Ear, and Throat: Mr. Hayton. 3.30 P.M., Special Demonstration:—Selected Eye Cases: Mr. Worton. 5 P.M., Venereal Clinic: Mr. E. Gillespie and Mr. Benians.

THURSDAY.—2.30. P.M., Medical Out-patients, Dr. A. J. Whiting. Surgical: Mr. H. W. Carson. X Rays: Dr. Metcalfe. Gynæcological Operations: Dr. A. E. Giles. 3.30 P.M., Medical In-patients: Dr. R. M. Leslie.

FRIDAY.—2.30 P.M., Surgical Out-patients: Mr. Gillespie. Eye Diseases: Mr. A. S. Worton. 7 P.M., Venereal Clinic: Mr. E. Gillespie and Mr. Benians.

SATURDAY.—2.30 P.M., Surgical Operations: Mr. H. W. Carson.

THE THROAT HOSPITAL, Golden-square, W.

MONDAY, Feb. 18th.—5.15 P.M., Special Demonstration of Selected Cases.

THURSDAY.—5.15 P.M., Clinical Lecture.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, 49, Leicester-square, W.C.

THURSDAY. Feb. 21st.—5 P.M., Chesterfield Lecture:—Dr. M. Dockrell: The Papular Eruptions.

ROYAL INSTITUTION OF GREAT BRITAIN, Albemarle-street, Piccadilly, W. 1.

TUESDAY, Feb. 19th.—3 P.M., Prof. A. Keith: The Problems of British Anthropology. (Lecture III.)

ROYAL INSTITUTE OF PUBLIC HEALTH, 37, Russell-square, W.C. 1. Course of Lectures and Discussions on Public Health Problems under War and After-war Conditions:—

WEDNESDAY, Feb. 20th.—4 P.M., Lecture VI.:—Lieut.-Col. L. W. Harrison, D.S.O.: The Management of Venereal Diseases in the Civil Community.

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions and others possessing information suitable for this column, are invited to forward to THE LANCET *Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.*

SWINDALE, J. A., M.D. Durh., has been appointed Certifying Surgeon under the Factory and Workshop Acts for the Ramsgate District of the county of Kent.

WATT, J. L., M.B., C.M. Aberd., Certifying Surgeon under the Factory and Workshop Acts for the Tavistock District of the county of Devon.

Vacancies.

For further information regarding each vacancy reference should be made to the advertisement (see Index).

When the application of a Belgian medical man would be considered the advertisers are requested to communicate with the Editor.

BARROW-IN-FURNESS, NORTH LONSDALE HOSPITAL.—Second House Surgeon. Salary £250 per annum, with board, &c.

BIRMINGHAM AND MIDLAND EYE HOSPITAL, Church-street.—Resident Surgical Officer. Salary £250 per annum, with board, &c.

BRISTOL ROYAL INFIRMARY.—House Physician and House Surgeon, Salary at rate of £120 per annum, with board, &c.

BURY INFIRMARY.—Junior House Surgeon. Salary £200 per annum, with board, &c.

DERBY, DERBYSHIRE ROYAL INFIRMARY.—Resident Surgical Officer.

DUDLEY, GUEST HOSPITAL.—Vacancy on Honorary Surgical Staff.

DUMFRIES AND GALLOWAY ROYAL INFIRMARY.—Resident Assistant House Surgeon.

GREAT NORTHERN CENTRAL HOSPITAL, Holloway-road, London, N.—House Physician for six months. Salary at rate of £100 per annum, with board, &c.

LIVERPOOL, BROWNLOW HILL POOR-LAW HOSPITAL.—Resident Assistant Medical Officer. Salary at rate of £300 per annum, with rations, &c.

LONDON COUNTY MENTAL HOSPITAL, Bexley, Kent.—Temporary Assistant Medical Officer. Salary 6 guineas per week, with board, &c.

MANCHESTER CITY.—Temporary Assistant Tuberculosis Officer. Salary £450 per annum. Also Female Medical Officer. Salary £400 per annum.

NEW HOSPITAL FOR WOMEN, Euston-road.—Two Female House Surgeons. Salary at rate of £50 per annum, with board, &c.

NOTTINGHAM CHILDREN'S HOSPITAL.—Female House Physician and Anæsthetist for six months. Salary at rate of £250 per annum, with board, &c.

NOTTS COUNTY COUNCIL.—Assistant Tuberculosis Officer. Salary £500 per annum.

NOTTS EDUCATION COMMITTEE.—Assistant School Medical Officer. Salary £350 per annum.

OLDHAM COUNTY BOROUGH.—Assistant Schools Medical Officer. Salary £325 per annum.

PLYMOUTH EDUCATION AUTHORITY.—Assistant School Medical Officer. Salary £300 per annum.

PLYMOUTH, SOUTH DEVON AND EAST CORNWALL HOSPITAL.—House Physician. Salary £200 per annum, with board, &c.

PORTPATRICK, PARISH OF.—Resident Medical Officer and Public Vaccinator. Salary £60 per annum and vaccination fees.

PRESTON ROYAL INFIRMARY.—Resident Medical and Surgical Officer. Salary £120 per annum, with board, &c.

QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, Bethnal Green, E.—Surgeon. Salary £25 per annum. Also Clinical Assistant.

READING, ROYAL BERKSHIRE HOSPITAL.—Senior Resident Medical Officer. Salary £350 per annum, with board, &c.

ROCHDALE INFIRMARY AND DISPENSARY.—Junior House Surgeon. Salary £200 per annum, with board, &c.

ROYAL HOSPITAL FOR DISEASES OF THE CHEST, City-road, E.C.—Resident Medical Officer. Salary at rate of £300 per annum, with board, &c.

ROYAL LONDON OPHTHALMIC HOSPITAL, City-road, E.C.—Second House Surgeon. Salary at rate of £75 per annum, with board, &c.

ST. MARK'S HOSPITAL FOR CANCER, FISTULA, AND OTHER DISEASES OF THE RECTUM, City-road, London, E.C.—House Surgeon. Salary at rate of £250 per annum, with board, &c.

SALFORD COUNTY BOROUGH.—Assistant Medical Officer for Child Welfare. Salary £350 per annum.

UNIVERSITY OF LONDON.—External examiners.

WESTMINSTER HOSPITAL, Broad Sanctuary, S.W.—Physician.

WESTMORLAND CONSUMPTION SANATORIUM AND HOME, Meathop, Grange-over-Sands.—Second Assistant Medical Officer. Salary £200 to £250 per annum (according to experience), with board, &c.

WHITECHAPEL DISPENSARY FOR THE PREVENTION OF CONSUMPTION.—Temporary Medical Officer. Salary £500 per annum.

WILTS COUNTY COUNCIL GENERAL EDUCATION COMMITTEE.—Dental Surgeon. Salary £250 per annum.

WOOLWICH METROPOLITAN BOROUGH.—Female Assistant Medical Officer of Health. Salary £500 per annum.

THE Chief Inspector of Factories, Home Office, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Biggleswade, Bedford, and at Farnborough, Hants.

Births, Marriages, and Deaths.

BIRTHS.

ALCOCK.—On Feb. 3rd, at Barton-street, Gloucester, the wife of Arnold Alcock, M.B., B.S., of a son.

DOBSON.—On Feb. 4th, at Addison-road, the wife of Captain E. L. Dobson, H.A.C., R.A.M.C., of a son.

HOFFMAN.—On Feb. 9th, at Tatsfield Lodge, Tatsfield, Surrey, the wife of Harry Drummond Hoffman, M.A., M.B., of a son.

LUMSDEN.—On Feb. 6th, at Lyme Regis, the wife of Lieutenant H. F. Lumsden, R.A.M.C., of a daughter.

PICKLES.—On Feb. 9th, at Greenbank, Temple Ewell, Dover, the wife of Surgeon W. N. Pickles, R.N.V.R., of a daughter.

READE.—On Feb. 7th, at Beaumont-street, the wife of Surgeon A. G. L. Reade, R.N.V.R., of a daughter.

STEWART.—On Feb. 1st, at 1, Greville-road, Southampton, the wife of Wm. Stewart, M.B., of a son.

MARRIAGES.

CHALMERS—MOIR.—On Feb. 6th, at Montrose, Captain T. Chalmers, R.A.M.C., to Emily Alice, daughter of Mr. and Mrs. John Moir, The Mount, Montrose.

GILES—GILES.—On Feb. 9th, at St. Mary's Church, Ellesmere, Captain Austin Charles Giles, M.C., R.A.M.C., son of Dr. Oswald Giles, of Sleaford, Lincolnshire, to Violet Ethel, daughter of H. R. Giles, solicitor, Ellesmere.

NASH-WORTHAM—DONALD.—On Feb. 5th, at Holy Trinity Church, Royal Leamington Spa, Captain F. Leslie Nash-Wortham, F.R.C.S. Edin., R.A.M.C., to Victoria Eugenie Wilgress Donald, youngest daughter of Mr. W. W. Donald and the late Mrs. Donald, of Kincraig, Royal Leamington Spa.

THORN—ROBINSON.—On Feb. 6th, at St. Luke's Church, Chelsea, by Rev. William F. Cobb, D.D., Surgeon Harold Eustace Thorn, M.B., B.S., R.N., youngest son of the late Alexander Thorn and of Mrs. Thorn, 42, Elm Park-gardens, to Beatrice Beryl, youngest daughter of the late Arthur Robinson, of 22, Sussex-square, Brighton.

DEATHS.

AIKMAN.—On Jan. 31st, at Birnam, Guernsey, John Aikman, M.D., in his 68th year.

BRYCE.—On Feb. 6th, at Copenhagen-street, N., James Bryce, M.D., aged 65 years.

CLARK.—On Feb. 4th, at Hill View, Cheshunt, Herts, Walter Frederick Clark, L.R.C.P. & S. Edin., D.P.H. Lond., aged 67 years.

JOHNSTON.—On Feb. 4th, at his residence, 160, London-road, Leicester, Thomas Arnold Johnston, M.D., son of the late Rev. Thomas Johnston, Ballborough, co. Cavan, Ireland, and of Mrs. Johnston, Princess-road, Leicester.

LAW.—On Feb. 6th, at Northlands, Guildford, Brigade Surgeon John Law, late of the Indian Medical Service, in his 84th year.

PAGE.—On Feb. 3rd, at 53, Warwick-avenue, Bedford, passed peacefully away Fleet-Surgeon A. M. Page, R.N. (retired).

SEWARD.—On Feb. 11th, at Chandos-avenue, Oakleigh Park, Middlesex, William Joseph Seward, M.B. Lond., aged 65 years.

WILSON.—On Feb. 8th, at St. Ursula Grove, Southsea, Hants, Brigade Surgeon William James Wilson, M.D., A.M.S., late Gloucestershire Regiment (28th), aged 80 years.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

EDITORIAL NOTICES.

In consequence of the pressure on our space and the shortage of paper, the Editor may be compelled to abbreviate communications, as an alternative to their rejection, when time does not allow them to be reconsidered by their authors.

It is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

It is especially requested that early intelligence of local events having a medical interest, or which it is desirable to bring under the notice of the profession, may be sent direct to this office.

Letters, whether intended for insertion or for private information, must be authenticated by the names and addresses of their writers—not necessarily for publication.

We cannot prescribe or recommend practitioners.

Local papers containing reports or news paragraphs should be marked and addressed "To the Sub-Editor."

Offices: 423, STRAND, LONDON, W.C. 2.

MANAGER'S NOTICES.

TO SUBSCRIBERS IN THE UNITED STATES.

Messrs. Wm. Wood and Co., of New York, have relinquished their Agency for the supply of THE LANCET in the United States. The Manager of THE LANCET will be pleased to supply copies direct from the London Office to subscribers in the United States at the strictly prepaid rate of $8 for twelve months. Subscriptions may commence at any time. Drafts and Money Orders should be made payable to the Manager, Mr. CHARLES GOOD, 1, Bedford-street, Strand, London, W.C. 2, England.

TO SUBSCRIBERS.

WILL Subscribers please note that only those subscriptions which are sent direct to the Proprietors of THE LANCET at their Offices, 423, Strand, London, W.C. 2, are dealt with by them? Subscriptions paid to London or to local newsagents (with none of whom have the Proprietors any connexion whatever) do not reach THE LANCET Offices, and consequently inquiries concerning missing copies, &c., should be sent to the Agent to whom the subscription is paid, and *not* to THE LANCET Offices.

Subscribers, by sending their subscriptions direct to THE LANCET Offices, will ensure regularity in the despatch of their Journals and an earlier delivery than the majority of Agents are able to effect.

TO COLONIAL AND FOREIGN SUBSCRIBERS.

Subscribers abroad are particularly requested to note the rates of subscriptions given on advertisement page 4.

The Manager will be pleased to forward copies direct from the Offices to places abroad at the rates shown, whatever be the weight of any of the copies so supplied.

METEOROLOGICAL READINGS.

(Taken daily at 8.30 a.m. by Steward's Instruments.)

THE LANCET Office, Feb. 13th, 1918.

Date.	Rainfall.	Solar Radio in Vacuo.	Maximum Temp. Shade.	Min. Temp.	Wet Bulb.	Dry Bulb.	Remarks.
Feb. 7	...	62	55	45	51	52	Overcast
,, 8	0·10	81	56	46	49	49	Raining
,, 9	0·05	76	54	43	47	48	Cloudy
,, 10	...	77	57	48	49	52	Cloudy
,, 11	...	60	55	48	48	50	Fine
,, 12	...	60	52	46	48	49	Overcast
,, 13	0·03	61	53	48	48	49	Overcast

Other information which we have been accustomed to give in these "Readings" is withheld for the period of the war.

The following journals, magazines, &c, have been received:—Annals of Tropical Medicine and Parasitology, American Medicine, American Review of Tuberculosis, Revista del Instituto Bacteriologico, Buenos Aires, Medical Bulletin, Veterinary Review, Medical Review, Journal of Hygiene, Revista Medica del Uruguay, Clinical Medicine.

Notes, Short Comments, and Answers to Correspondents.

SEVERE VULVO-VAGINAL PRURITUS TREATED BY RESECTION OF PERIPHERAL NERVES.

FOR this very troublesome and often intractable complaint many remedies have been tried, often without material relief. Various surgical measures, too, have been adopted. Burn and Simpson (Glasgow) have divided the genito-crural nerve, the ilio-inguinal, and the superficial perineal nerve. But it may be inevitable in these instances that the sphincter nerve for the anus will be damaged. The resection of the perineal branches of the internal pudic nerves has been done for chronic and painful uretero-cystitis (Rochet; Albertin and Rafin). Submucous injections of alcohol are claimed to give good results for pruritus (Harvey Stone). When the pruritus is held to be of central nervous origin, resection of certain nerve roots, or, better, intra-arachnoid injections of anæsthetic solutions, may give relief, which in the latter is usually only transitory. Even excision of the vulvar mucous membrane has been advised; Gumnert reports 9 cures in 9 cases. In the current number (September-October, 1917) of the *Annales de Gynécologie et d'Obstétrique* Dr. Mauclaire recommends resection of the superior perineal nerve behind the transverse muscle of the perineum or resection of the inferior perineal nerve in front of this muscle. He records details of a case where this operation was done, the superior nerve being resected on the right side, the inferior on the left. The day following both the perineal pain and the itching had disappeared. She experienced some numbness, with vulvar and perineal hypoæsthesia. The sore places soon healed. Four months later the numbness had gone, but the hypoæsthesia remained. The patient, now much better, resumed her ordinary activities, and when seen a year following the operation she was still well. There was no itching and the hypoæsthesia was still present, being more marked upon the right side than the left. The result was thus satisfactory, and it will be interesting to hear if similar results can be obtained for this distressing malady.

THE CASE OF JAMES BARRY.

A RECENTLY published book, entitled "Roll of Commissioned Officers in the Medical Service of the British Army who served on full pay within the period between the Accession of George II. and the formation of the Royal Army Medical Corps, 20 June, 1727, to 23 June, 1898," with an introduction showing the historical evolution of the Corps, by the late Colonel William Johnston, C.B., M.A., LL.D. Aberd., M.D. Edin., Army Medical Staff (retired), edited by Lieutenant-Colonel Harry A. L. Howell, R.A.M.C. (Aberdeen: At the University Press. 1917. Pp. 638), comprises the condensed outlines of the careers of 7601 officers arranged in chronological order of commissions, with a full alphabetical index. The introduction by Colonel Johnston, completed by Lieutenant-Colonel Howell, covers 45 pages of most interesting historical matters followed by a statement of the sources of information. The outlines of the careers of many of the officers contain interesting pieces of information; others are confined to the mention of dates of appointments and of death, and some other particulars in an abbreviated form, to which abbreviations a key is supplied at the commencement of the book. We were interested to look up No. 3632, James Barry, who was a medical officer in the Army from 1813 to 1865, but no indication is given in the account (strictly correct perhaps from an official point of view) that this officer was really a woman. She is stated to have died in London on July 25th, 1865, and the authority given for this is D.N.B., which, as everybody knows, is the Dictionary of National Biography. We have had the curiosity to look this up, and find the reference correctly copied; but in the photograph of the tombstone which we reproduced in THE LANCET on Oct. 8th, 1910, erected in Kensal Green Cemetery, the date is clearly readable as "Died 15th July, 1865, aged 71 years." This old sandstone slab had fallen over and was re-erected by Colonel Rogers, the author of a book, "The Modern Sphinx," but we do not know if the inscription was

Communications, Letters, &c., have been received from—

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F.—Dr. R. Ferris, Valencia; Capt. W. A. N. Fox, R.A.M.C.; Mr. D. Fisher, Dundee; Prof. N. Federici, Milan.

G.—Capt. W. Gilmour, R.A.M.C.; Glasgow Corporation, Public Libraries, City Librarian of; General Post Office, Money Order Dept., Lond.; Dr. J. Gillespie, Belfast; Glasgow Royal Hospital for Sick Children, Sec. of.

H.—Dr. T. W. Hime, Bradford; Mr. S. E. Howes, Lond.; **Messrs.** Holland and Sherry, Lond.; **Messrs.** Abel Heywood and Son, Manchester; Mr. W. F. Higgins, St. Margaret's-on-Thames; Fleet-Mr. J. Howell, Cheltenham; Holborn Surgical Instrument Co., Lond.; Surg. T. D. Halahan, R.N.

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T.—Mr. J. Thin, Edinburgh; Capt. J. C. Tull, C.A.M.C.

V.—Messieurs Vigot frères, Paris; Volta Bureau, Washington, D.C.

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(*Continued at foot of next page.*)

re-chiselled or was left untouched. However, there is a discrepancy here for which there is no explanation at hand. We have also been interested to look up the account of 4733, Sir Thomas Longmore, who did so much for the advancement of ambulance. At the conclusion of many interesting details it is stated, "Biography with Portrait in Lancet, 25 Oct., 1895." We should point out that it really was in THE LANCET of Oct. 12th, 1895, p. 952, where a full account is given of a remarkable man.

HORSE-MEAT IN AMERICA.

THE quinquennial report (1913-17) of the Department of Health for New York City mentions the rapid rise in popularity of horse-flesh as human food. Although only available during the past year, and under rigid restrictions, the business in horse-meat has rapidly extended, reaching 10,000 lb. in February and 30,000 lb. in December. Meat at 8 to 16 cents per pound is a boon to many and a palatable luxury to those who are wise and unprejudiced: is the remark with which the report concludes.

BRIGHTON AND WOMEN POLICE.

ALTHOUGH once unsuccessful, the women's societies of Brighton (15 organisations were represented at a conference presided over by Mrs. Herbert Jones, wife of the Bishop of Lewes) have just decided to again appeal to the Watch Committee of the Brighton Corporation for the appointment of fully trained policewomen. The satisfactory results of policewomen in America and on the continent, the conference claims, justify their appointment in Brighton, and is of the opinion that it would be in the public interest and might result in the reduction of crime and in the greater moral rectitude and happiness of the community.

LIQUID PARAFFIN AS A TASTE-SUBSTITUTE FOR BUTTER AND SALAD OIL.

To the Editor of THE LANCET.

SIR,—In an interesting note published in your issue of Feb. 9th (p. 242) Dr. F. Parkes Weber suggests two or three ways of taking liquid paraffin in an agreeable form. He incidentally points out, however, that "one of the great disadvantages in the therapeutic use of paraffin will be at the same time avoided—namely, the occasional passage (sometimes involuntary passage) of small liquid oily motions, more or less free from true fæcal material—an occurrence which may prove the source of considerable discomfort and annovance." This observation emphasises the importance of employing only an oil of standard viscosity, as was pointed out in an inquiry the results of which were published in THE LANCET of Oct. 2nd, 1915, and August 12th, 1916, respectively. You then reported that oils which flow more rapidly, showing a viscosity under 105 seconds flow at 100° F. in the Redwood apparatus, are less likely to produce that steadiness of lubrication which is physiologically desirable; they frequently produce pain, and they may even escape involuntarily without lubricating at all. The standard of viscosity, in my opinion, is of much greater importance than the standard of specific gravity. They are by no means interchangeable terms. The British Pharmacopœia provides for the latter but not for the former.

I am, Sir, yours faithfully,

Feb. 12th, 1918. LUBRICANT.

*** The investigation in question was carried out in THE LANCET Laboratory with the idea of establishing the very points made by our correspondent.—ED. L.

"ANIMAL LIFE AND HUMAN PROGRESS."

THE second lecture of the series (see THE LANCET, Feb. 9th, p. 240) was delivered on Feb. 6th by Dr. G. C. Bourne, D.Sc., F.R.S., Linacre Professor of Comparative Anatomy in the University of Oxford. Zoologists, he said, had not been used by the Government to the extent that they might have been in the present war, but the loss of life and sickness had been less than in any previous war, and although this was due to pathology and preventive medicine, which deserved all the praise possible, the result could not have been attained without the zoologist. In Germany the doctrine of the struggle for existence had been claimed as sanction for everything we were fighting against. The most recent zoological doctrine did not support the teaching that a species necessarily improved through the competition of the individuals composing it. Zoological research sanctioned the belief that we might restrict competition and that, if matters went well with us, we might hope to arrange that small nations might occupy their own territories withdrawn from competition, while in the social state groups of individuals and individuals themselves might be withdrawn from competition one with another, and this without deterioration of the race. He gave many instances to show that the science of zoology had a high educational and moral value, and it would be calamitous, he said, if its teachings were not included in the reconstruction work upon which all educationists would soon be actively engaged.

On Feb. 20th, at 5.30 P.M., Professor J. Arthur Thompson, LL.D., will deliver a lecture on "Man and the Web of Life," Professor Arthur Keith, F.R.S., presiding.

GERMAN ILL-TREATMENT OF PRISONERS.

Dr. Basilevitch, one of the 110 Russian doctors who have returned from captivity, desires to be put in touch with British colleagues who have actually witnessed ill-treatment of prisoners in German and Austrian prisoners' camps. Letters may be addressed to him at St. Luke's Vicarage, Finchley, London, N. 3.

Surgeon X.Y.Z.—The statements or inferences are not accurate. The original company consisted largely of German shareholders; the Kaiser, it is said, was one. The subsidiary company is under British control, and, even if the directors desired, it would not be possible for them to receive goods from Germany.

(*Continued from previous page.*)

Letters, each with enclosure, are also acknowledged from—

A.—Australian Red Cross Society, Lond., Sec. of; Associated Newspapers, Lond., Manager of; Anglo-French Drug Co., Lond.

B.—Dr. T. S. Brodie, Wishaw; Bradford Children's Hospital, Sec. of; Miss S. Bostock, Lond.; Capt. C. H. C. Byrne, R.A.M.C.; Mr. W. Bryce, Edinburgh; Messrs. Burgersdijk and Niermans, Leiden; Mr. W. R. Barlow, Trinity, Newfoundland; Brecon and Radnor Joint Counties Asylum, Talgarth, Clerk to the; Mr. R. W. Burkitt, Nairobi; Bury Corporation, Treas. to the; Mr. W. A. Bowring, Brighton; Blackburn Corporation, Acct. to the; Dr. R. D. Batten, Lond.; Birmingham University, Sec. of; Dr. C. H. Browning, Lond.; Mrs. L. Birchall, St. Day; Mr. L. M. Bowen-Jones, Carmarthen; Mr. E. Bougault, Paris; B. C.; Bootle Corporation, Acct. to the; Staff-Surg. H. H. Babington, R.N.; Dr. C. Brown, Colchester; Dr. R. T. Bakewell, Lond.; Lieut. T. R. Brown, R.A.M.C.; Messrs. Bedford and Co., Lond.; Bethel Hospital, Norwich, Clerk to the.

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W.—Major G. C. Willcocks; Wimbledon Corporation, Treas. to the; The Warneford, Oxford, Sec. of; Dr. G. S. Wigoder, Dublin; Messrs. W. Wood and Co., New York; Wounded Allies Relief Committee, Lond., Sec. of; West London Post-Graduate College, Lond., Dean of; Whitechapel Dispensary for the Prevention of Consumption, Sec. of; Mrs. Wynne, Dublin; Dr. A. J. Wharry, Brighton; Woodilee Asylum, Glasgow, Steward to the; Capt. H. B. Wilkinson, R.A.M.C.; Dr. J. H. Whitaker, Lond.; Wolverhampton General Hospital, Sec. of; W. A.

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